



FRIDAY, NOVEMBER 18.

NEWS OF THE WEEK.

We give below, in a condensed form, the leading news items of the week. These items will be found in detail in their appropriate columns.

Meetings Next Week.—Buffalo, Rochester & Pittsburgh; Western New York & Pennsylvania.

Personal.—John D. Kieran resigns as New York Railroad Commissioner.

Elections.—Baltimore, Grafton & Charleston, John Bradshaw, President.—Canada, La Crosse & Southwestern, F. A. Rozine, President.—New York, Ontario & Western, E. Canfield, Chief Engineer.—New Hampshire Railroad Commission, B. T. Prescott.—Toledo, Saginaw & Muskegon, David Robinson, Jr., President.—Western New York & Pennsylvania, G. Clinton Gardner, President.

New Companies Organized.—Central Indiana files articles in Indiana.—Chicago & West Side files articles in Illinois.—Durango, Cortez & Salt Lake is incorporated in Colorado.—El Paso & Northwestern Railway & Telegraph is incorporated in Texas.—Portage & Southwestern is incorporated in Wisconsin.—Topeka Belt is incorporated in Kansas.

Changes and Extensions.—*Arkansas:* St. Louis, Iron Mountain & Southern extended from Bald Knob to Wynne.—*Georgia:* Raleigh & Gaston locates extension from Fraulinton to Durham.—*Kansas:* Union Pacific will be extended from Topeka to Wichita.—*Massachusetts:* Chatham & Harwich is completed.—*Ohio:* Ohio & Northwestern completes change of gauge; Cleveland, Akron & Columbus, Dresden Branch, completed to Warsaw.—*Pennsylvania:* New York, Lake Erie & Western completes line from Hawley to Pittston.—*North Carolina:* Durham & Northern begins work at Durham.—*Texas:* San Antonio & Aransas Pass is extended to Flatonia

Traffic.—Anthracite coal shipments for the week ending Nov. 12 show an increase of 1.9 per cent., as compared with the same period last year; bituminous shipments show an increase of 8.5 per cent. Cotton receipts, interior markets, for the week ending Nov. 11 show an increase of 8.9 per cent., as compared with the corresponding week last year; shipments show an increase of 6.6 per cent.; seaport receipts show an increase of 10.2 per cent.; exports an increase of 33.7 per cent.; cotton in sight is greater than at the same date last year by 1.8 per cent.

Earnings.—For the month of October 51 roads report their gross earnings, 47 having an increase over the corresponding period of last year. The total net increase is 10.4 per cent.; 31 roads report gross and net earnings for the month of September, 6 having decrease in net; the net increase is 13.5 per cent.; 5 roads report gross and net earnings for August and 7 for the eight months ending Aug. 31. For the nine months ending Sept. 30, 12 roads report gross and net earnings; the net increase is 21.1 per cent.

Miscellaneous.—Blue Spring, Orange City & Atlantic is sold.—Des Moines, Osceola & Southern is sold.

Contributions.

How to Deal with a Sudden Rush of Passengers.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The letter in your paper of Nov. 4 from "A Victim," concerning the accommodation of passengers at ticket offices when there is a rush of travel, touches upon a point which I have not seen mentioned in print before, but which deserves attention, for it is a difficulty which happens occasionally on every large road, though generally in so mild a form as to entail nothing worse than "cussing." I have had the same question in my own experience, though I never had a lawsuit, and I believe have never paid any money damages. The practical problem in the matter, however, is to devise the best way to guard against such annoyances, for, of course, railroad officers regret them as much as anybody can.

I cannot say that I am prepared to suggest a remedy, but I jot down a few thoughts in the hope that somebody of more extensive experience will enlighten myself and others through your columns.

I think that at way stations, and in fact everywhere where a train can make up time without unusual danger, the station-agent or ticket seller ought to be empowered to request the conductor to wait a minute or two in case the passengers are not all provided with tickets in season. The agents should be carefully instructed and cautioned not to relax their efforts to have all passengers and baggage in readiness for trains; and then conductors should be required to give due heed to agents' advice. To have agents authorized to absolutely hold a train would perhaps be dividing authority in a manner subversive of discipline, but conductors should at least be made to be cautious and thoughtful. The rule might be for them to comply with agents' requests, but to promptly report all cases that seemed unreasonable, or all that involved more than a certain number of minutes' delay. Many superintendents hesitate to issue any order which will involve making up time, because reckless running may possibly be encouraged, but I think that ought to be no great obstacle. A maximum speed should be fixed for all parts of the road and engineers held to it. There is nothing wrong in a 30-mile-an-hour

train making up time on track which is traversed every day by 40-mile-an-hour trains. If the cars and engines are in as good condition it is as safe for one train to run fast as for another. The extra cost of running fast is the only objection.

Any station where there is the least probability of ever encountering a crowd should have a railing so that ticket-buyers can be kept in line. It is surprising, with all our growth in civilization and courtesy, how surely the growth of hoggishness keeps pace with it. Lots of people, apparently gentlemen and ladies, will walk right over other people's rights at a ticket office.

At such a station as the Grand Central in New York the question is harder to solve. It is not easy, I suppose, to hold trains there, because such action would block other trains. It might be said that one should do the best he could, and then let passengers bring on their complaints; they would be very few. But that is not a business-like way. I think even at the Grand Central trains should be held whenever possible. In a very great rush an extra should be run. I believe in carrying passengers at a loss once in a while to keep them good natured. To run a special when one is not obliged to almost always elicits compliments, and a newspaper puff frequently. Banks accept all business that is inside the doors at the closing minute. I understand the large freight stations in New York City have a closing hour, rigidly observed. Teams must be in line at 5 p. m. (or a certain hour) and all *that are in line* at the prescribed hour are attended to, if it takes all night. This would not be an unjust rule for ticket offices. When a rush is certain to occur, as on holidays, etc., of course preparation should be made. Things should be arranged before hand, so that trains could be held a few minutes; or else sections should be run. Every gateway should be arranged so that it could on occasion be enlarged and additional men put on. If it were very necessary to start trains on time a notice to the public might be issued, warning them to "come early to avoid the crowd." Railroads have as much right to do this as theatres or dry goods stores.

D. S.

Mr. Kirkman's Freight Received Book.

CHICAGO, Oct. 31, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have been very much interested in your criticism on Mr. Kirkman's recently adopted freight received book and expense bill. Your exposition of the subject is perfect, but is it not true that the bulk of the receipts taken by railway companies from consignees is taken on a freight receipt book which is also a freight received book? This is certainly the case in Chicago and all over the Northwest. The consignee or his drayman signs a book for each consignment of freight. At competitive points, in order to prevent a consignee's seeing what his neighbors are receiving, loose receipts have been adopted. These loose receipts are objectionable because of the difficulty and expense of binding and keeping them. I do not think Mr. Kirkman's book is as cumbersome as the present form, considering that the practice of keeping both a freight receipt and a freight received book has been abandoned. I have not examined Mr. Kirkman's book very attentively, but so far as I am able to judge I think it extremely simple and adaptable. I understand he has changed the original form somewhat, so as to include three receipts on a page instead of one. A great merit of the book, and one that I have heard highly commended by railroad men, is the fact that the records are accurate; that one paper corresponds exactly with another; that nothing can be omitted or added without its appearing. I note what you say about the expense. It may be possible that the combining of the expense bill and freight received book will cost a trifle more for printing and paper than when printed separately, but I hardly think the difference would be very great. Indeed, it seems on the face of it as if it would be cheaper. The including the notice of arrival of freight I suppose was designed to be used only at large stations, as it is only there that notices are sent at all. The duplicate form is the one for practical use.

F. P. A.

[There is no question that Mr. Kirkman's book is simple in principle, but that is not always the chief consideration. It is simple in principle to print a score or two of instructions on each voucher or waybill, but it is "bad form," nevertheless. There is too much tendency in the railroad world to save labor at all hazards, regardless of all else. A neat and compact notice or voucher may not have a direct influence on gross receipts, but it is noticed by the customer. Aesthetic considerations still deserve at least a small place; clumsy work may be tolerated indefinitely, but it is clumsy still. Shingle nails were used for years at a certain station to affix cards to freight cars; this probably hurt nobody, but it showed an unreliable judgment. Loose receipts are, indeed, more troublesome than a book, but in nine cases out of ten an examination of them when a year old will reveal one important point of difference between them and a book, to wit; the loose sheets will have signatures on them while from 20 to 90 per cent. of the book entries will not. There are Eastern roads that make one book answer at small stations for both records, but the usual practice seems to be the old method of using separate books. But whether it be or be not the prevailing practice to keep receipts separate from the financial record, it is undoubtedly the best practice. The

freight received record should be written up somewhat at leisure; the receipts must often be made in a hurry; the former is needed in the cashier's department in balancing, etc.; the latter must be accessible to the delivery department. The cost of Kirkman's as compared with the ordinary plan would vary according to style and quality of paper; but at a moderate estimate we should say the manifold process would cost at least ten times as much as the other. Some railroad officers say that many ordinary clerks are clumsy and slovenly in using carbon paper, and it must be remembered that many agents at small stations rank somewhat below "ordinary" in this respect.—EDITOR RAILROAD GAZETTE.]

The Post Bearing Plates for Rails.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I saw in your issue of Sept. 30, 1887 (page 630), that you illustrated our teated steel bearing plates. I find in your description a mistake, correction of which might be useful to your readers.

You say our plates are made of "puddled iron." In my description in *Glaser's Annalen* I point out on the contrary that puddled iron (fibrous Schweissen) would be very bad for these plates (longitudinal cracks). The material used is *mild steel* (Flusseisen) either Thomas, Bessemer or Martin-Siemens.

T. W. POST,

Permanent Way Engineer, Netherland State Railway Co.
UTRECHT, Holland, Oct. 31, 1887.

Car Service.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The long needed and much talked about "Reform in Car Service" appears at last to be close at hand. The Pennsylvania and the Erie, the pioneers in this respect, together with the important additions since noted, now aggregate 36 roads working under the improved system, and the results thus far have been most satisfactory. We may, therefore, say that the feasibility of the plan recommended by the Car Accountants' Association is no longer, considered from an operating standpoint, problematical, but is an assured fact. The practicability of the system, from an economic standpoint, has also been demonstrated by the fact that but little additional force is required to take care of the per diem side of the account, the Erie having added only two men to a force of 65, an increase of less than 3 per cent. aggregate expenses over the old system. This is significant, and effectually disposes of the bugaboo that the system would be too expensive in operation. Car-service is in a most deplorable condition; this is not disputed; then why not employ the means of improvement now at hand?

Many, while admitting the general justice of the plan, hold back because to their particular road the pecuniary result promises to be unfavorable. This factor, in connection with the fact that there is nothing to compel the adoption of the new system by all roads, may appear as a barrier to the general introduction of the system. Such a view, however, is not substantiated by a careful consideration of the question. Remembering that the announcements of the Pennsylvania and the Erie were made suddenly and without any heralding of the event, the large number of roads so promptly falling into line should be taken as a favorable precursor that per diem has come to stay. This position is strengthened by the fact that many more roads have already signified their intention of joining at an early date.

The special car service committee appointed by the presidents of the trunk lines held their third meeting in Commissioner Fink's office on Tuesday of this week, and a resolution was passed recommending to the presidents the adoption by the trunk lines of the mileage and per diem system, viz.: 3¢ cent per mile and 15 cents per day; and that a special committee be appointed, consisting of one officer from each trunk line, to agree upon the details for working the plan. Should this recommendation be acted upon favorably, a new impetus will be given to the move through such strong endorsement, and the prestige of these lines, which contribute so largely to the car supply of the country, must sooner or later lead to the general adoption of the system.

The roads that do not now come forward and voluntarily adopt the system on account of some real or fancied cause for believing it against their pecuniary interests, will look at the matter in an entirely different light when the appeal for their co-operation comes to them direct from their important connections. The question then resolves itself into one of principle; and can we not safely rely upon the sense of fairness of the American railroad officer being strong enough to lead to even pecuniary sacrifice for the sake of right and good service? The roads supplying equipment are entitled to a fair earning upon it, and should not be expected to furnish any more than the demands of trade under prompt service require. Should there remain, however, some roads proof against all entreaties for co-operation upon the basis of justice and equity, would not the natural effects resulting from the system in operation on their connecting lines or on their competing lines lead them to the adoption of the system as a matter of business protection? For instance, if all lines running to tide-water at Baltimore, Philadelphia and New York work under the system, and give cars prompt dispatch or pay for the detention, would not the roads running to other seaboard points operating under the present system be placed at a great disadvantage in securing export business from Western centers—especially at times like the present when there is a premium on cars?

We may safely conclude, however, that while the system will not be of direct advantage to all roads, it will ultimately work hardships to very few. The first necessity will be the inauguration, on the part of roads not having it, of a comprehensive system for watching car movements and surrounding them with protection against unnecessary delay. Fifty per cent. of the delays under the present system may be classed as unnecessary. The new system simply clears away this dead wood, to the great advantage of the many, with detriment to the very few.

CAR SERVICE.

The Slowness of Reform.

SYRACUSE, N. Y., Nov. 15, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have been much interested in reading your appeals to the managers of our railroads to "brace-up" their affairs; to have brakes on freight trains; to take out weak cars from their passenger trains, put in more safety signal's, etc.; to make their brakemen and other employés work in a more lively manner, and so on; but it seems to me that something more than argument ought to be applied. The law ought to be brought to bear to correct some of the abuses which are tolerated all around because the public does not overhaul the railroads as it should. What is everybody's business is nobody's; people do a heap of talking but do not act. They elect men to the legislature who are expected to make the railroads do their duty; but when once in the public place the legislators give their time to politics; unless, indeed, they are engaged in taking bribes from the railroad officers. I am a railroad man myself, but I am in a low grade and so have no influence. I am not a sorehead, but I would like to see some of the higher officers who seem so self-satisfied made to treat the public and the employés better than they do. I think the drummer who wrote you some weeks ago hit the nail on the head. There seems to be a great lack of enterprise in many places. They neglect improvements where even a poor judge can see that they would make money by making them. I advocate giving the railroad commissioners power to compel the roads to make improvements and to do as they agree. I read a newspaper article lately which proved that a railroad left off a regular sleeping car and made women and children sit up all night just because the car could for a single night be made to earn more money on another route. What an outrage! The same writer said he had found five tickets on one train which had been blundered in some way by the ticket agent so that the passengers would be likely to have a fight with the conductor. Of course the passenger would get the worst of it, because conductors, if they are disposed to be reasonable and lenient, do not dare to be otherwise than overbearing lest their superiors blame them. I believe, as you say, that railroads should have conductors who know enough to treat folks gently; mainly in such cases; but the railroad commissioners must start the reform; the railroads will not. This article also referred to the notorious fact that most passenger trains run awfully slow, especially on branches. A few limited trains—limited to wealthy people—are run at good speed, and the balance are run at about the rate an Irishman could roll a barrel of salt. Look at the slow way the railroads introduce safe heaters for their passenger trains. They might have had them all fixed up by this time. One big road I know of has done nothing about steam for fear they will scald somebody. Just as though people wouldn't as soon be scalded to death as roasted alive.

Employés will never get justice till the state takes their part. A friend of mine, who is a train dispatcher, works 12 hours a day, and yet there are others right on the same road who have to work only eight. The matter has been taken to the head men, but no satisfaction is got out of that. The division superintendents on a road I know of have to work twice as hard as the one I am under. No wonder that accidents happen when men are overworked.

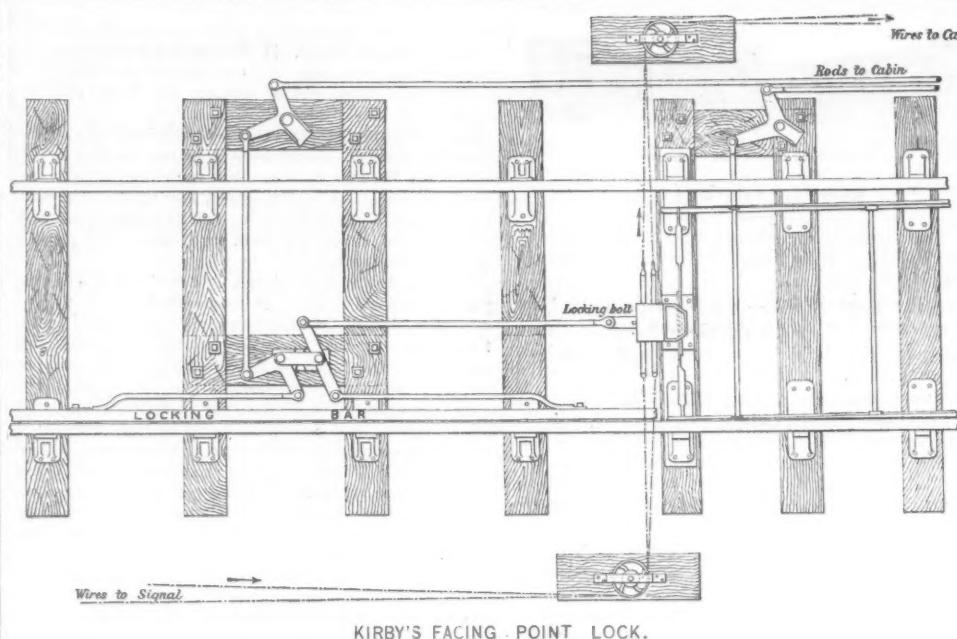
I have been looking to see if my road would pay premiums in my department. You say that all employés should have that kind of encouragement, but I do not yet see any signs of anything of the sort. It disgusts me to see so much carelessness in making men do their part. I find that after I take pains to do my work well and to treat the public as well as they deserve, and better, that another man working almost at my side, as you might say, and who lacks enterprise and lets his men neglect passengers every day, seems to be thought just as highly of as I am. I should be too proud to make this complaint at the office, but it is true; and with the understanding that my name is not to be published I speak out for the benefit of others.

I know legislatures make wrong laws; but it is some satisfaction to have any kind of a law. It starts the officers around and at least gives them to understand that there is *some* power besides their own sweet wills. If an unjust law was passed it would soon be repealed, so the railroads have nothing to fear.

If you will aim your rhetoric at the Legislature and the railroad commissioners you will do more good than you will to be hammering away at railroad officers.

Y. R.

[While these suggestions are mainly apt and to the point, the writer of them forgets some important considerations. Railroad commissions would be good regulators of railroad business if they were always intelligent, educated, fair-minded and experienced; but the working of our form of government makes them otherwise. If legislators take bribes, or even are influenced, it may be largely attributed to the system that has grown out of the practice of enacting special legislation such as "Y. R." wants more of. Specific complaints as of the misuse of the sleeping car have to



KIRBY'S FACING POINT LOCK.

be fought out one by one. As in the evils connected with the freight claim department referred to by a recent correspondent, there is no question what the railroad's duties are; the penalties are prescribed well enough already; the difficulty is the lack of patience to enforce them. Publicity, which diffuses light in many quarters that would otherwise remain dark, which teaches railroad officers who are inclined to be narrow or unjust, or are influenced by only selfish motives, is good; and anything Y. R. can accomplish in getting the state to make public the doings of the railroads will, undoubtedly, be labor well spent. The way to get pay increased or hours decreased, for train-dispatchers or any one else, is to have the real nature of their work and responsibilities well understood; this is publicity. Neither a legislature nor any other body should order men's hours decreased unless it has evidence that the long hours impair men's efficiency; nor should pay be raised unless efficiency can be increased thereby. Railroads do often reduce charges, increase facilities and enhance efficiency against their wills because competition compels them to, and afterwards find reason to congratulate themselves for having been forced to take action. Good missionary work could be done by preaching this fact to slow-going officers. Let Y. R. take the field.—EDITOR RAILROAD GAZETTE.]

Kirby's Facing Point Lock.

The accompanying illustrations show an improved method of locking split switches firmly in position. The improvement consists in providing means whereby any defect in the working of the switch, the locking bolt or locking bar or breakage of switch rod connections is detected.

Most of our readers are probably acquainted with the general features of facing point locks, but a brief description may be useful.

The "locking bar" (see illustration) prevents the switch being moved while a train is passing or standing on the track. This locking bar is actuated by a lever in the cabin, which also works the "locking bolt," which passes through a slot in the stretcher bar connecting the switch rails. It is obvious that when this bolt is in this slot, it secures the switch firmly in position. Unless the switch is properly home and set fairly for either one road or the other, the bolt cannot be moved, as it cannot enter the hole in the stretcher bar.

Mr. Kirby's invention, which has been brought out by Messrs. Saxby & Farmer, of London, Eng., is shown in our engraving, and consists of a new description of plunger, working in connection with an improved patent facing point lock, and by its use any defect in the working of the points, the locking bolt or locking bar, or breakage of point rod connections is detected. The locking slides of the facing point lock plunger being connected to and working with the signals, and by special mechanism interlocking the plunger bolt and the stretcher bar of the points, it is impossible to lower a signal until the points have been bolted, and then only that signal can be lowered which corresponds with the position in which the points are set. When either signal is lowered, the points are firmly locked in the corresponding position.

The arrangement is suitable to signals worked by means of rods, or by wires, and although the illustration shows the application to two signals only, it is obvious it is applicable to a greater number by simply increasing the number of locking slides.

The illustration shows the points unlocked with the locking lever normal, but if desired this can be reversed and the points can stand locked by the facing point lock.

The locking acts direct upon both tongues, so that both must be in proper position and locked before a signal can be given.

The locking bolt is connected to and worked by the locking

bar so that it is impossible to move the locking bolt for bolting or unbolting the points without at the same time moving the locking bar, therefore, although the connections may be broken or disconnected, it is impossible to unbolt the points while a train is passing over them.

We are indebted to an English contemporary, the *Railway Engineer*, for the above description and accompanying illustration.

The Westinghouse Brake in Boston.

The tests at Lake Walden, on the Fitchburg Railroad, near Boston on Monday of this week were the same as those previously reported and with similar results. The 50-car train was stopped at 19 miles an hour in 123 ft.; at 32½ miles in 406 ft.; at 34 miles in 483 ft. The 20-car train was stopped at 20 miles an hour in 111½ ft.; at 38 miles in 310½ ft. These tests developed nothing new, but are simply additional evidence of the uniform reliability of the apparatus. By the nearly 400 railroad officers and others who saw the performance for the first time the tests were thoroughly appreciated. One of the railroad men present jotted down the following comments by officers near him:

"Something like it must be adopted in the interest of humanity to employés. I would rather have my men under cover and comfortable than on the top of icy cars in a winter's night. They cannot brake a train well when they are half frozen."

"Absence of lost motion between cars or between wheels and brake shoes."

"Ease and simplicity of application and remarkable promptness of release."

"On my road a train breaking apart two or three times would pay for equipping the whole with air-brakes."

The tests ended with a novel competitive exhibition of the comparative efficiency of the new triple valve and the valves now almost universally used in passenger service. The 20 cars of the freight train and the 12 passenger cars of the Fitchburg railroad train were run side by side on parallel tracks, each drawn by one of the Chicago, Burlington & Quincy engines. As to the result of this novel race we have the lurid report of the sporting editor of the *Boston Journal*:

"With the cabs of the engines abreast of each other, the trains rushed up the track at nearly 40 miles an hour, steam and smoke rolling in heavy volumes and a miniature whirlwind of dust racing alongside, a sight that brought cheers from the spectators on the hillside. A flash by the post, a hiss from the brakes as they settle to their work, and the passenger train forges ahead and is still moving, while its competitor is at a standstill. The new brake has triumphed; at a speed of 38 miles the freight has stopped in 12 sec., running 319 ft., while at the same speed the passenger train has run 547½ ft. and has taken 17 sec. to stop."

Haynes' Kinemeter.

The accompanying illustration represents an instrument for determining velocity. It is adapted to determine the slip of frictional gearing, belting, locomotive driving wheels, etc., and can be used to ascertain the rate of unknown motion by comparing it with known motion, such as clockwork. The kinemeter is, therefore, intended to serve the purposes of a speed indicator, recorder and governor.

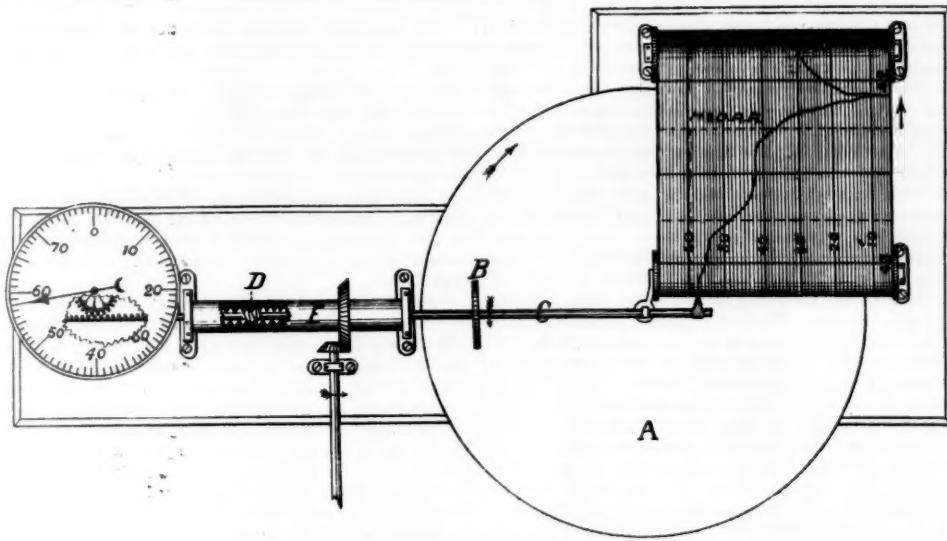
It is difficult to estimate the speed of a railroad train, and when an accident occurs disputes frequently arise as to the actual speed of the train. It is believed that much of the present uncertainty and insecurity would be prevented were a trustworthy and simple means of indicating and recording the speed placed on the engine.

The machine, as shown in the accompanying engraving, consists of the following essential parts:

A circular disk or plate *A* revolving on its centre by clock-work at a uniform rate of speed.

A wheel *B* revolving on its centre by friction contact with the face of disk *A*.

A rod *C* keyed to the wheel *B*, and, besides its revolving motion, has a longitudinal motion which permits wheel *B* to



take any position from the centre to the periphery of disk A. A screw or worm D is keyed to rod C, and, therefore, revolves with wheel B.

A female screw or nut E engages with and revolves in the same direction as the worm D, and is actuated by the shaft of which the speed is to be determined.

The speed of the wheel B varies as its distance from the centre of disk A, since circles are proportionate to their radii. The revolving actions of the worm and nut tend to move wheel B in opposite directions; the worm toward, and the nut from the centre of the disk; the worm to decrease, and the nut to increase the speed of the wheel.

In operation, these tendencies remain of equal force, and the worm and nut turn together without friction. If one tendency becomes stronger, momentarily, it slides the rod and moves wheel B into a new position, which changes the speed of the wheel and worm to correspond with that of the nut. The wheel B keeps that circular path on which it can travel with the variable speed of the nut, and the position of any point on the rod C indicates the speed of the nut or of any shaft driving the nut, directly or by intermediate gearing.

The rod may be connected with a rack and a pinion carrying an index on a circular scale which will indicate the speed at the moment of observation; or, it may carry a marker to record the speed on chart paper, which moves in a direction at right angles with rod D, or it may govern the speed of the prime shaft, by being connected with the steam valve or other source of power, by electric contact, pneumatic, or other familiar mechanical agencies.

Of course, the parts of each instrument must be proportioned for the duty required. For railway trains, the recording paper should be moved by gearing from the car axle; then the speed will be shown for each point on the track. In most places, the recording paper should be moved by clock-work, then the speed will be shown for any time in the day. The wheel B follows paths of logarithmic spirals on the face of disk A, so that theoretically it can never reach the centre of disk A, which is the pole of the "logarithmic spiral;" and the sensitiveness of the instrument varies as the velocity, though much more rapidly.

Should the nut stop suddenly, the pencil of the recording apparatus would describe a curve, of which the zero line is an asymptote. The instrument therefore cannot indicate extremely low velocities. In practice this is no objection, for the instrument may be designed to measure any speed with any degree of accuracy by changing the threads of the worm and nut, by changing the diameter of the wheel B or by changing the velocity of disk A. If it proves easier of construction, the nut may be short and worm long, instead of as represented in the figure.

The speed record not only gives the speed for every point on the track, but also gives (though indirectly) the time taken in passing over any part of the track. This time equals the square of the distance divided by the area between the speed line and the zero line. This speed record, when accompanied by a description of the train, may be called a performance sheet. This sheet, in connection with the profile showing the grades and alignment, will be examined with interest by railway men, and information gleaned that will promote the economic operation of railways, as well as the economic location of future lines. This sheet will give a bird's eye view of the movements of the train, will show the time taken in starting and stopping, and will illustrate dynamic principles in a graphical and interesting way.

The kinemeter can also be used to delineate graphically the velocity of the wind, and show the variations in the speed of fast running engines for electric lighting, and for many other purposes, where a correct record of varying velocities is required.

Any further information may be obtained of the inventor, Mr. A. M. Haynes, 338 Hermitage Ave., Chicago.

Lighting Railroad Trains.

The following is an abstract of the report on this subject presented at the International Railroad Congress, held at Milan in September last.

Railway trains in Europe are lighted by the following

means: (1) Candles, (2) vegetable oil, (3) mineral oil, (4) carbureted air, (5) ordinary gas, (6) carbureted gas, (7) rich gas and (8) electricity.

1. *Candles* have been used where the climate is so cold that vegetable oils may be congealed, and are still used in sleeping cars as a reserve light. Candles are simple and adapted to all climates, but are 40 per cent. more costly than vegetable oil and require too much attention.

2. *Vegetable Oil*.—Rape seed oil is more commonly used than any other material for lighting in Europe. The following are its principal disadvantages: It is irregular, it hardens under extreme cold (this is sometimes partly remedied by the addition of petroleum or nut oil), it oozes out into the globe and obstructs the light, or drips to the floor and gives forth a nauseous odor: the refilling, cleaning, replacing the globes and wicks and the difficulty of controlling the consumption of oil are also disadvantages. Two styles of burners are used, viz.: Flat and round burners. Flat burners are more simple in construction, easy to light and to clean, require no chimney and are inexpensive. The light is poor and insufficient air is furnished to the flame, the focus too high in the lamp, part of the oil is distilled into the globe, the wick is rapidly carbonized, and the lamp burns well only two or three hours. They burn 63.5 g. for each carcel of light (= 9.5 standard candles). A cap or dome, as used for petroleum burners, increases the efficiency. The round burners give a superior light, as the combustion is more complete, and the flame whiter. As perfected by the Northern of France, these lamps, when furnished with a German silver reflector, consume 30-35 grammes of oil for 0.7 carcel, or 43 to 50 gr. per carcel, against 63.5 for the flat burners. They burn 18 to 20 hours, and for the first twelve hours the light remains very constant. It is said, however, that they drip 2 to 3 gr. per hour. The flame is very steady. The lamps are generally placed in the centre of the compartment under the roof, but are occasionally placed in the sides or partitions so as to light two compartments.

3. *Mineral Oil*, usually petroleum more or less refined, gives a very white and brilliant light, and is comparatively cheap, but it is difficult to keep a steady flame, the oil is volatile and a chimney is necessary. To render it safe from danger of fire, oil of a low inflammability ought to be used. The Great Northern, Great Eastern and the Midland railways in England, the Western and Paris & Orleans in France, and the State Railroad in Belgium all use this method of lighting. The hourly consumption is 35 gr., and the light about one carcel.

4. *Carbureted Air*.—A trial of the Westinghouse system was made on the London & Brighton and the Southwestern (England). Compressed air was passed over a volatile hydrocarbon, and the mixture of air and vapor burned under the form of gas. This system was abandoned on account of the danger of using volatile oils, and the difficulty of regulating the flame.

5. *Ordinary Gas* was first used on the North London & Metropolitan (underground) in England. The gas is contained in weighted rubber bags placed on the roof or in the baggage car. The bags are bulky, expensive and liable to decay, and the gas, being an unstable compound, cannot be stored for any time. To overcome these difficulties the ordinary gas was compressed and enriched by the addition of volatile oils.

6. *Carbureted Gas* was costly and not uniform in quality, the lighting power varying with the temperature and the jarring of the train. Volatile oils are, moreover, dangerous to handle or use. The Belgian state railroad has tried enriching ordinary gas by naphthaline, which is solid at ordinary temperatures, but which when heated to a vaporizing temperature and mixed with the gas, adds considerably to its illuminating power; 1.6 cu. ft. of this gas enriched by 31 grains of naphthaline gives an illumination of 0.8 carcel. An hourly consumption of 2 cu. ft. gives a light of 1.1 carcel, while uncarbureted gas often requires double this quantity. The first cost of the gas is 62 cents, and the net cost of the enriched gas is 80 cents per 1,000 cu. ft. The gas can be compressed to 15, 20 or even 30 atmospheres. This system is also being introduced in sleeping cars on other European railroads.

7. *Rich Gas*.—The lighting of railroad cars by means of

rich gas obtained from the distillation of paraffine oils and the residue of petroleum, has been used by the Belgian state, the railroads of Upper Italy, and other roads for many years. The gas is made and compressed at one or more points along the line and charged into reservoirs under each car. Each light will consume about 1.4 cu. ft. per hour of ordinary gas pressure, and by compressing the gas to 10 atmospheres, each car can carry a supply for five lights for 40 hours in a reservoir of 29 ft. cubic contents. The principal advantages of rich gas are cleanliness, considerably less labor in handling and cleaning the lamps; the flame can be lowered when the full light is not needed, and the lamp rooms and apparatus can be removed to a greater distance from the station. The principal disadvantages are, the erection of special gas works and compressing machines, pipes to stand the required pressure, and jets for charging; the difficulty of producing gas of uniform quality; great cost of the necessary plant; fouling of the pipes; variation of the lighting power according to the time the gas has been stored; it is a source of danger in case of accident; there is often a disagreeable odor.

With a view to decreasing the consumption of gas, some companies have directed the passengers how to lower the flame to the equivalent of a "night-lamp," and some have an automatic arrangement for reducing the flame.

8. *Electricity*.—The different sources of electricity which have been tried are:

(1) Primary batteries.

(2) Accumulators, or secondary batteries placed (a) in the van or baggage car, (b) in each car, so as to render the lighting independent.

(3) A dynamo electric machine connected to one of the axles with accumulators to keep up the lighting when the train is at rest.

(4) A dynamo operated by a special motor placed on the locomotive or in the baggage car, and supplied with steam from the engine or a special boiler.

Electric light presents the advantages of brilliancy, whiteness, steadiness, ease and convenience of management. Some of the difficulties are: Cutting up trains, if the supply be from a single source for the whole train, cuts off the cars from the light. The apparatus is usually complicated or delicate. The cost is not yet certainly known. If accumulators are used, the question of cost, etc., becomes still more complicated.

To increase the life of the lamps it has been proposed to shut off part of the light when the full power was not required. The introduction of compound-wound dynamos has, however, obviated some of the difficulties formerly experienced in train lighting.

(1). *Primary Batteries* cannot generally produce electricity economically, but it has been attempted to use such batteries for train lighting on the Midland and Southeastern (England). On the Midland, each car has 6 5-candle-power lamps; there were 15 Holmes and Burke elements put together in series of 5 elements each, and the electromotive force of each element was 1.85 volts and its internal resistance 1-40 of an ohm. The light lasted 10 hours without renewing the battery, but it was necessary to amalgamate the zincs twice a week. The solution around the zincs was a mixture of 1 part sulphuric acid and 12 of water. Around the carbon element was some kind of salt, precisely what is not stated. Similar results were obtained on the Great Northern, the Southeastern and the London & Southwestern. The cost is unknown, but as the battery has not come into extensive use, it is to be presumed that it is too high.

Inventors are still coming to the front with primary batteries which are announced to be capable of producing electricity for almost nothing, but trials have demonstrated very clearly that to produce electricity by the consumption of zinc or some other equally high priced metal is at least ten times more expensive than to get it from dynamo machines.

The International Sleeping Car Company is running a car daily between Brussels and Paris lighted by 14 electric lamps said to be of 10 candle-power, but really giving only 7 or 8. The experiments are under the charge of Mons. L. Desrueles, an engineer of Paris. The cost to the railroad is .5 cent per candle-power per hour, or five cents per lamp. The apparatus is valued at \$972. The cost of keeping it up would be, if the railroad company owned the apparatus, 10 cents per lamp. The lighting of the car costs about 78 cents per hour. There are 45 elements connected 15 in series and 3 in quantity. The zinc electrode is immersed in a solution of bisulphite of mercury and the carbon in a mixture of bichromate of soda, sulphuric acid and nitric acid. A charge of liquid lasts during four trips of seven hours each, and the zincs must be replaced by new ones about every sixteenth trip. Primary batteries have the advantage of being easily placed under each car and susceptible of making the light of each car independent.

(2). *Secondary Batteries*.—The London & Brighton made a prolonged trial of lighting by accumulators, taking them out for charging. It considers that the labor required for this is an obstacle to their practical and economical use. It also necessitates the erection of a sufficient number of charging stations or the transportation of the batteries to and from the place of charging. The placing of accumulators under each car would, as in the case of primary batteries, render the lighting of each car entirely independent. The Paris & Orleans also made some experiments with primary batteries, arranged (1) to charge the accumulators alone without feeding the lamps; (2) to feed the lamps from the accumulators only; (3) to charge the accumulators and feed the lamps at the same time. The accumulators were of the Faure type, and a sufficient number were carried to light the lamps for 20 or 30 hours. They were placed under the seats and the weight required was 450 lbs. to 650 lbs. per car. Two Swan lamps

* Reported by the management of the Belgian state railroads.

of 10 candle-power were used in each compartment. Lighting by means of accumulators can, of course, only be done with considerable loss, but this system seems to have the best chance of success, although these particular experiments did not succeed well, owing to the destruction of the plates and leakage of the boxes and the difficulty of maintenance. Improvements in the accumulators may improve the conditions and reduce the cost.

(3). *Dynamics Connected to a Car Axle, with Accumulators as a Reserve.*—The great difficulty of obtaining a regular current from the dynamo connected to a car axle makes the employment of accumulators as a regulator very important. They are necessary also to maintain the lamps lighted when the train stops at a station or elsewhere. Automatic appliances must be provided which shall cut off the current from the dynamo when it falls below a certain speed in order that the batteries may not discharge themselves through it. The dynamo must either always turn the same way or means must be provided for always delivering the current to the batteries in the same direction. There are many devices for this purpose.

Many railroads have tried this method. The transmission from the axle to the dynamo has been accomplished by belts, gearing, friction cones, worms, etc. Magnetic transmission has also been tried. None of these methods have been satisfactory, though the friction method gives the best results. A novel method has also been used by Preco & James, where a system of eccentrics on the axles compressed air, which was afterwards used in Brotherhood motors. The accumulators, instead of being in the car with the dynamo, are sometimes placed in every car in the train, but this increases the complication, though the cars are thus independent of each other, so that the cutting or breaking apart of the train does not extinguish the light. Besides the loss of electricity by the use of accumulators, this method requires a special car and a man to manage the apparatus, which greatly increases the expense. The London & Brighton, however, after a prolonged trial of accumulators charged at one end of the line, has now abandoned that system and uses a dynamo driven by one of the axles for charging accumulators.

(4). *Special Motor Operating a Dynamo.*—This scheme introduces more objectionable features than the preceding. The principal disadvantages are: (1) The extra consumption of steam, which, for a small motor, is usually very high (2) the care of the apparatus would be of necessity given to the engineer, who already has enough to do, (3) every time the engine was detached from the train the lamps would be extinguished, (4) a breaking apart of the train would leave the rear portion in darkness, (5) if the motor is placed in a car behind the engine it requires a special attendant for this car to go with the train. This apparatus makes a considerable addition to the dead load of the train and the cost of attendance is larger, (6) to render the lighting perfectly satisfactory accumulators must be used to regulate the light and maintain it while the engine is detached from the train.

The London & Brighton is lighting its "Pullman Limited Express" in this way. In the van is a small Brush dynamo operated by the rear axle by means of belts. There are 85 lamps of 16 candle-power each and a battery of 24 accumulators attached to this dynamo. In the daytime the dynamo charges the accumulators and the lamps are used only when passing through tunnels. The expense of lighting this train is not given, but it is said to be too costly for ordinary trains.

The management of the Royal railroads at Frankfort-on-the-Main has experimented with electric lighting. Three cars were fitted with lamps, and a dynamo and 26 accumulators were in the van, the dynamo being operated from one of the axles. The dynamo and accumulators weighed about 1,320 lbs. and cost \$625. The lamps in each car cost about \$20. The lighting cost 2 cents per lamp per hour, while gas lighting on the state roads of Belgium costs exactly 0.28 cents per burner per hour.

In 1884 the Metropolitan District (England) tried lighting by a dynamo and special motor. The total weight was over 3 tons, including water and fuel. A Siemens dynamo feeds 52 lamps of 18 candle-power each for 8 hours per day. Three cubic feet of water were evaporated at a pressure of 185 lbs. per square inch. Only 4½ horse-power appeared as electric work in the lamps and conductors, the rest being absorbed by friction, etc. The cost of lighting, not including labor, was estimated at 1.375 cent per lamp per hour; if the labor be included, probably as much more. This experiment was not satisfactory, as the boiler fouled very quickly and had to be taken to the shop for cleaning. In the experiments made on the Wurtemburg railroads in 1886, the dynamo was run by a belt from a pulley on one of the axles of the baggage-car. An electric regulator was used and a number of accumulators sufficient to keep the lamps lighted for 5 hours were placed in each car. The accumulators were put in circuit to be charged only when the speed of the train reached 20 miles per hour. When the current became too great it was automatically interrupted. The current was divided between the lamps and the accumulators, and when the train stopped these latter furnished the current for the lamps until the train was again running at 20 miles per hour. The dynamo worked whether the train went forward or backward, because the brushes adjusted themselves automatically to the direction of the train. It appears that the accumulators worked satisfactorily. The cost of the dynamo was from \$750 to \$1,000, according to the number of cars in the train. The cost for each car varied from \$163 to \$205, according to class. The cost of maintenance for 2,100 hours of lighting per year, everything included, was 2 cents per lamp per hour. The lamps were of the Bernstein system and the accumulators of the Khotinsky type.

An express train running between Vienna and Trieste was

fitted with a dynamo and Calo accumulators, 28 in number, weighing 37 lbs. each. They were sufficient for lighting 40 lamps of 8 candle-power each during the stops of the train. The dynamo at 1,200 revolutions gave 100 volts and 50 amperes. It had an automatic compensating apparatus for regulating the flow of the current into the accumulators or the lamps, or both at once. The lighting was for about 15 hours per day. The trials appear to have been satisfactory.

A train running between Munich and Starnberg was lighted by a dynamo run by an Abraham 4-cylinder engine. The light was very unsteady. In England a similar experience was had with a Willans motor and a dynamo. A mixed system devised by M. Donato Tommasi burned gas during the stops of the train, electricity furnishing the light when the train was in motion. The electric current partially shut off the gas. This does not appear to be a practical system.

The trains while passing through the tunnels on the Glasgow underground are lighted by electricity. A third rail laid between the other two is carefully insulated and connected to one pole of a dynamo, the other pole of which went to earth the two outside rails of the track are also grounded. Rollers under every car make contact with the third rail and convey the current to Swan lamps in the cars, the current returning to the dynamo through the wheels and the earth. The lamps were thus automatically lighted on entering the tunnel and extinguished on leaving it.

Electric Headlights have been used between Munich and Tolz, Strasburg and Wissenbourg, on the Northern of France, and on the State Railway of Austria. The Northern of France rejected the system not because of its working badly, but on account of the expense. No information has been obtained regarding the experiments in Austria. Among the chief difficulties to be overcome was the jarring of the locomotive. It is also difficult to keep the arc in the focus of the reflector. Another serious annoyance is the placing of an electric machine upon the locomotive.

All the foregoing trials demonstrate the possibility of lighting trains by electricity, but the question of the most practical system is not yet solved. All the systems of electric lighting of trains not known would at least double the regular cost for maintenance, beside the first cost of the apparatus, which should also be considered. For the Belgian state roads, the annual cost of lighting trains by gas and oil is more than \$90,000. In the present state of the question, electrical lighting appears too expensive except in special cases where its use is justified as a luxury, and the expense is only a question of secondary importance.

The German Traffic Union.

The German Railroad Traffic Union is founded upon the Tariff Union which dates back to 1868. In October of that year the opinion was expressed in the North German Association that all matters relating to the tariffs of the following four railroad unions: Prussia and Brunswick; the Saxony and Westphalia; the North German; and the Rhine and Thuringia should be considered in common conference. The state directors of the Brunswick railroads undertook to summon the several companies composing the unions above mentioned to a conference, and the first common conference met Feb. 16, 1869.

Here it was resolved that periodical meetings of the four unions should be held to fix such rates as should touch directly or indirectly the interests of two or more of the confederate unions, in which conferences those questions should be discussed before the decision of the individual unions, and that prior to such open discussion no changes should be made in rates by the individual unions.

The Ducal directors of Brunswick assumed the presidency of the combination, and under their excellent leadership the combined associations developed a very vigorous activity. These common parliaments soon came to be known as tariff conferences, and the new combination received the name of the Tariff Union. In 1870, it was joined by the Saxony & Westphalia Railroad Union. In 1871 the Northwestern German Union joined, and was soon followed by the remaining corporations subject to the Middle, Northern and Eastern systems.

An attempt at reorganization was made in 1877 because it was thought that, in view of the impending introduction of one general system of tariffs on all the German roads, the Tariff Union, in the complicated condition in which it then was, would not be able to carry out satisfactorily the purpose it had in view, namely, to make general regulations for the tariffs and traffic officers.

No reorganization was then effected, for just at that time the Minister of Commerce for the Kingdom of Prussia brought the Union to the notice of a board of commerce charged with the drafting of general tariff laws and the classification of freight, in consequence of which the standing committee upon rates was appointed and the general conferences of the German railroads were instituted. Through this proceeding the greatest and best part of the work of the Union was taken from it, and it saw that even though it should ultimately bring into consideration all the questions bearing upon tariffs this could be done only by preparatory exertions, and that the project of extending the Tariff Union to all the roads in Germany must be abandoned.

In view of the essentially altered ends of the Union, it was deemed advisable for the individual corporations composing the various associations to be thereafter looked upon as the component units of the Union instead of the associations themselves; so it was finally stated in 1878 that 48 corporations belonged to the Union, comprising all German roads except the state systems of Bavaria, Wurtemburg, Baden and Hesse, the Imperial roads, the Main Neckar and Pfalz roads and the royal Prussian road to Saarbrucken. Moreover, it was joined by the state roads of Holland and the Dutch Rhenish.

Thus composed, without constitution or formal order of business, the Union worked most beneficially till the close of 1885.

Had not the completion of its work (then nearly finished) been granted to the Union by the common consent of the German state governments, it would have been compelled to set aside all questions relating to tariffs after the appointment of the standing tariff committee.

Nevertheless it gave some valuable advice, and established some good precedents in traffic affairs, and also worked out an excellent scheme of service which has been adopted with more or less alteration for all the wants of the German Railroad Union.

Feb. 27, 1886, a conference met comprising representatives of many of the German railroads, and agreed to organize a German traffic union for the permanent adjustment of those branches of service engaged in the transportation of persons, freight, cattle, vehicles, etc., except in such cases as fall within the jurisdiction of the standing committee on tariffs, also for the object of bringing about as good an understanding as possible about such provisions; and for the establishment of a commission for the consideration of regulations for the Union. The royal directors of the Hanoverian railroads were requested to superintend the proceeding relative to matters other than those enumerated. On the basis of these conclusions the original Tariff Union announced its dissolution the very next day, after 18 years of existence.

By May 1886, the committee appointed for the new union had drawn up a constitution and order of proceedings. The great difficulty was to determine how the Union could issue decrees binding on all its members without trespassing too far upon the independence of the component corporations. To meet this difficulty the committee decided that as a rule decrees were to be carried by a majority, and when so carried were to be regarded as decrees of the Union, but need not be adopted either by the members or by a majority of the companies. That every associate body must declare under what circumstances it would carry out these decrees, or whether it would carry them out at all; but that the Union should have the right to make unanimous specification of certain circumstances wherein a decree ratified by a majority of all the members must be adopted and carried out unaltered, save in case of the opposition of a fixed minority.

The companies assembled in Cassel, June 26, 1886, and accepted the constitution and order of proceedings drawn up by the committee, and in accordance with the constitution elected a board for the transaction of business and established the "Committee on the Traffic Union."

The board chosen consisted simply of the royal directors of Hanover. Their term was for three years. After the expiration of the time assigned for the declaration of the decrees of the conference to the individual companies, the board was able to announce, Aug. 14, 1886, that the German Railroad Traffic Union was organized in due form.

It comprises 55 railroad companies, including 11 Royal Prussian railroads and three foreign ones, the Dutch, the Holland and Rhine and the State system of Holland. The object of the Union is the permanent organization of that branch of the service having to do with the transportation of passengers, baggage, vehicles, live animals and freight as well as the bringing about of a satisfactory understanding about the ordinances touching these matters, especially as to the regulation of speed and of fares, having in view the limits of the province of the standing committee with respect to the general conferences of German railroads to be held upon all questions of tariff.

For the attainment of this end the Union issues decrees, which either merely recommend to the members such measures as may come into consideration, or else bind the members to their execution. The circumstances in which binding decrees can be made are set forth in an appendix to the constitution, and are at present as follows:

1. Executive ordinances having to do with the transportation of troops, of army supplies, etc., on roads to which the ordinances may apply.

2. Executive ordinances for the conditional fixing of rates of transportation, in circumstances unprovided for, on roads to which the ordinances may apply.

3. Rules for dealing with missing freight and baggage, or such as is over weight, damaged, etc., etc.

4. Rules for the disposal of articles found in so far as local legislation may not interfere upon certain roads.

5. The simplification of the treatment of freight and indemnification claims for passengers, baggage or other property.

6. The introduction of general forms for freight rates, time-tables and fares.

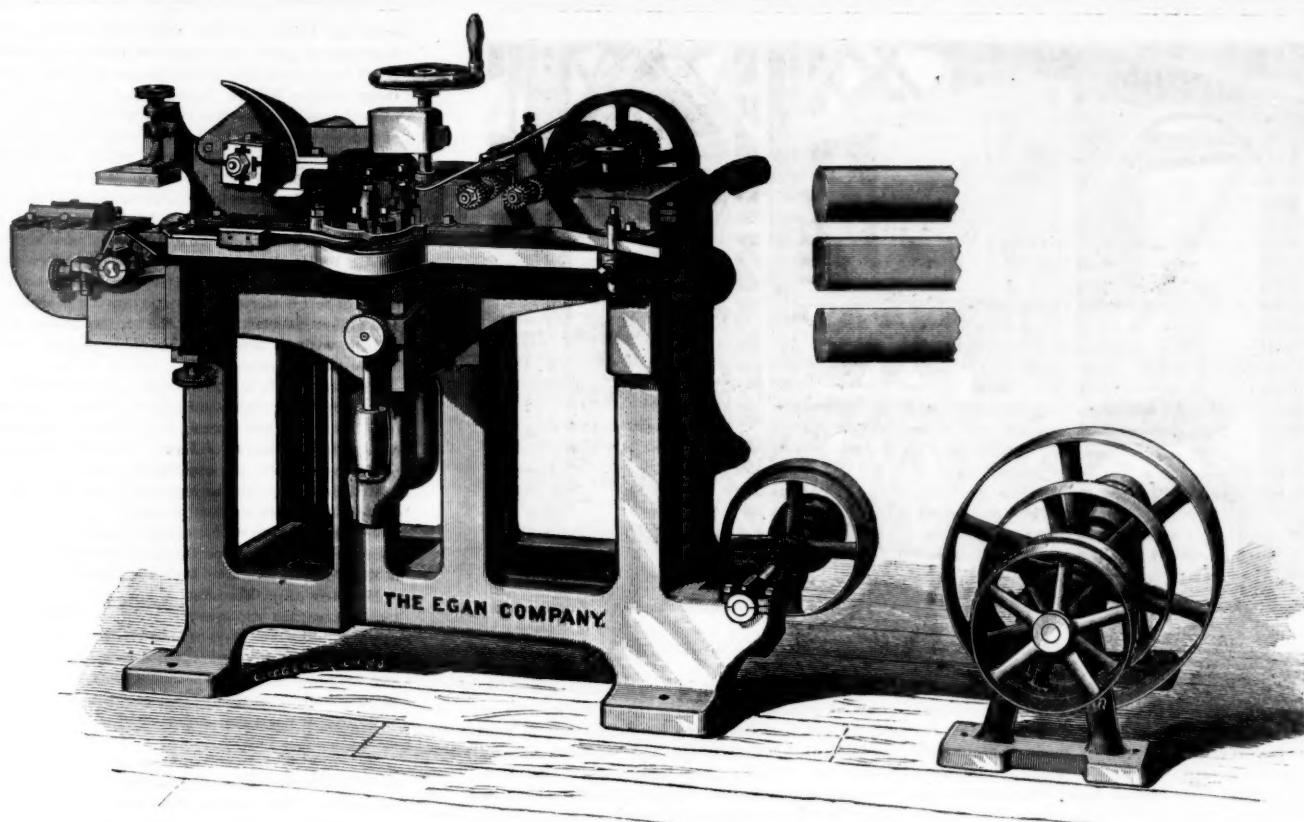
7. The establishment of general ordinances about the locking and the use of cars.

8. The equalization of rates for transportation of articles for public exhibitions.

All decrees of the Union affecting the first named branches of service must remain subject to supplementary specifications in writing, made by the companies of the Union. The specifications of Appendix I., as well as the cases in which the decree of a majority is binding, can be altered or supplemented only by a unanimous decree in writing, whereby the members coming within the definitions laid down shall be considered agreed. The decrees of the Union touching the cases specified in Appendix I. must be put into effect by all the members within the prescribed period and carried out until the Union shall in like manner resolve upon some change or repeal.

These binding measures apply only to the relations of the members to one another, so that the members are untrammeled in ordering the local affairs of their own roads.

As to the execution of decrees, both binding and not binding



IMPROVED BLIND SLAT PLANING MACHINE.

Made by the EGAN COMPANY, Cincinnati, Ohio.

ing, every company must notify the board of direction within a stipulated time which of them it has carried into execution, and then the board is to inform all the members.

All propositions to the board of directors for the establishment of decrees must first be considered by the committee, except such as shall have been declared urgent by the Assembly of the Union.

In committee meetings as well as in the semi-annual assembly of the Union each member represented has but one vote and the voting is by simple majority.

For the subsequent definition of these decrees made by the companies in writing, every member is entitled to a number of votes proportional to the amount of road subject to its jurisdiction, as follows: Under 50 kilometers, 1 vote; 50 to 150 kilometers, 2 votes; 150 to 300 kilometers, 3 votes; 300 to 500 kilometers, 4 votes; and for every further 200 kilometers 1 more vote.

From what is thus far known of it, it is evident that the German Railroad Traffic Union has sought out and defined for itself a field for work from which results may be obtained most important to the well being of the railroads of Germany. Its members have by no means failed to take the work in hand with energy. Even as early as Oct. 5, 1886, the committee having met at Hamburg found most abundant material for its consideration, and was able by Oct. 17 to inform the representatives of the Assembly of the Union then in session at Frankfort that as many as 20 motions had been carried, having to do with most diverse branches of the service.

These notes of the origin and present form of the Association under which a large part of the German roads now work are translated from the *Journal of the German Railroad Union*.

A Discovery of Carbonate Iron Ore at Enterprise, Miss.*

A few months since, Prof. Lawrence C. Johnson, of the S. Survey, discovered in Mississippi large deposits of carbonate iron ore, geologically located in the Claiborne formation of the Tertiary Epoch. These deposits are not pockets, but continuous layers or beds extending for miles, and can be located with certainty where they have not been removed by erosion.

Upon examination recently made by G. W. West, Birmingham, Ala., the largest deposits and highest grades of ore were found near Enterprise, Lauderdale County, and in Clark County, Miss. These beds measure from 10 to 18 ft. in thickness, are superimposed upon a "burn rock," associated with green sand and dip 30° ft. to the mile southeast, at an altitude of 350 ft. above sea-level, can be mined and economically worked by open-cutting after a few feet of stripping. In some places even this will not be found necessary, the ore being exposed at the surface. A number of analyses have been made by the writer and others, fully demonstrating the ore to be of sufficiently high grade to be marketable.

Ore Analysis.

	Iron.	Silica.	Phosphorus.
1.	31.82	40.30	0.382
2.	51.11	7.54	0.078
3.	42.82	19.62	.....
4.	39.62	20.52	.....
5.	14.75	.....	0.150
6.	46.80	.....	0.028
7.	30.12	36.00	0.620
8.	35.38	45.40	.....
Average	36.55	28.23	0.252

These analyses show the principal constituents of the ore

except the carbonate of lime, which occur in small shells, rendering the material nearly self-fluxing.

No. 5 was selected as being high in lime, to ascertain whether it would be high in phosphorus and ought not to go in as ore. No. 6 was made for D. McLaren, Supt. M. & O. R. R. Analyst not known. No. 7 was part of analysis made by Jos. Albrecht, New Orleans, La., which also shows 5.50 carbonate of lime. No. 8 was made by Chas. Mohr & Son, Mobile, Ala. Roasting these ores dries all the volatile matter and increases the percentage of iron. The roasted ore was unfortunately, so far as I know, not analyzed.

Under the advice of the writer and Mr. West, about 60 tons of ore were roasted and shipped to Birmingham, and a furnace-run was made by Mr. B. T. Shewell, furnace superintendent of the Alice furnace, yielding an output of 40 per cent. of No. 3 foundry iron. In this test, the mixture was one half Red Mountain soft ore, and one-half Enterprise carbonate ore. The iron compares favorably with No. 3 foundry iron made two years ago at the same place, but with different cinder and burden.

The analyses are as follows:

Iron Analysis.		
I.	II.	III.
Total carbon	2.488	4.076
Silica	3.549	3.870
Phosphorus	0.717	0.489
Sulphur	0.242	0.040
Manganese	0.143	0.389
Iron (by difference)	92.881	91.136
	100.000	100.000

I. No. 3 foundry iron made at Alice furnace with $\frac{1}{2}$ Enterprise carbonate ore, 1887.

II. No. 3 foundry iron made at Alice furnace, with $\frac{1}{2}$ soft and $\frac{1}{2}$ hard red ore, 1885.

The following cinder analyses are also given for comparison:

Slag Analysis.		
I.	II.	III.
Protode of iron	0.270	0.436
Silica	45.460	35.000
Alumina	16.690	14.362
Lime	32.805	45.370
Magnesia	1.080	1.398
Binoxide of manganese	0.083	trace
Sulphur, & Sulphide of Calcium	1.571	1.875
Phosphoric acid	1.963	1.500
Undetermined loss	0.008	0.050
	0.070	.....
	100.000	100.000

* Oxide of iron and manganese.

I. Slag made during the run of Alice furnace on mixture containing Enterprise ore.

II. Slag made at the Sloss furnace in June, 1886, on No. 1 foundry iron.

III. Average constitution of slag made at Alice furnace in 1885, when producing iron such as is shown in iron analysis II. above.

Such a slag as II., though frequently made for months at a time by Birmingham furnaces, can scarcely be called typical of their practice. The endeavor now is to get higher silica, whereas formerly 31 to 32 per cent. silica and 13 to 15 alumina was rather the rule than the exception. The figures under III. are estimated from many analyses, and probably represent fairly the cinder accompanying pig-iron II. above. Unfortunately no analysis was made of that particular cinder. It will be seen that slag I. is much more siliceous than III.; in fact I never before heard of a cinder produced in this district with so much as 45 per cent. of silica. As the iron in the two cases was of similar grade and quality, it seems clear from these analyses that highly siliceous slags, involving less lime, and therefore a smaller burden, could be used in the Birmingham district with a gain in fuel economy. The ordinary Alice furnace slag now ranges high in silica.

With regard to the deposits at Enterprise, it may be added that they are advantageously situated for development. An abundant supply of water may be obtained from several creeks; there are in the immediate neighborhood immense primitive pine forests, suitable for both charcoal and lumber; and, finally, two trunk lines of railroad, the Queen and Crescent and the Mobile & Ohio, run through Enterprise, contiguous to the ore-beds, which lie between them and are easily accessible to both.

Improved Blind Slat Planing Machine.

We illustrate herewith a new four-sided blind slat planing machine for planing all kinds of blind slats for coaches on all four sides at one operation and making small moldings.

The machine is new and improved in design and construction. It is claimed that it will not tear out or chip on cross grained stuff, but makes a perfectly smooth slat, free from any wave or breaking out of edges, and that the side cutters can be run as long as the plain bits without sharpening.

The frame is cast in one piece, allowing for long belts for each cutter head and making a very solid and durable frame, capable of standing any amount of strain.

The spindles are large and of the best cast steel and run in self-oiling boxes lined with genuine Babbitt.

The upper and lower heads are of cast steel and slotted on all four sides.

The side-heads are made of gun-metal and carry three knives each. The side heads are placed in the machine in such a manner as to prevent undue wear on the knives when cutting the slat, which is a point well worth considering.

The machine can also be used for all kinds of light moldings, door stiles and work of that class and has two changes of feed.

Any further information can be obtained of the manufacturers, the Egan Co., Cincinnati, O.

Car Axles, Bearings and Lubrication.

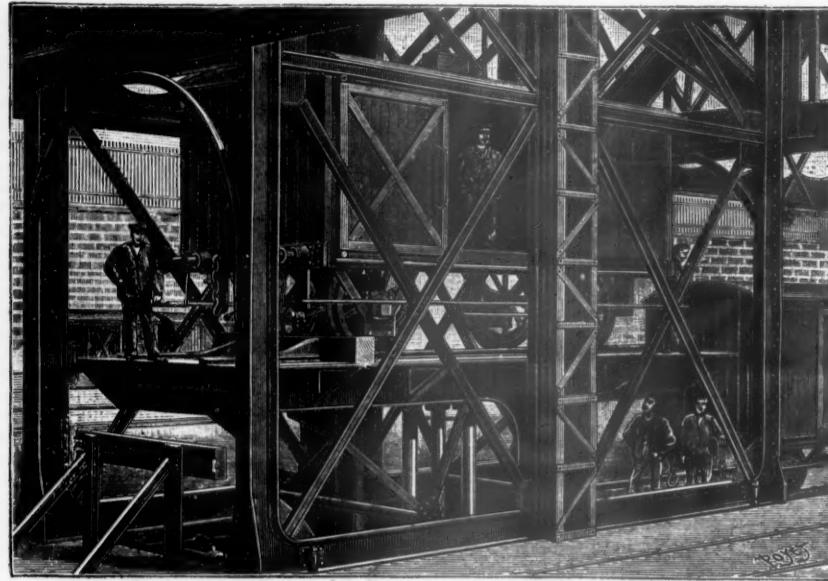
This subject was discussed at the last meeting of the New England Railroad Club, Nov. 9. A brief summary of the discussion appeared in our last issue, but the following detailed report will be read with interest:

THE PRESIDENT: We are making rapid strides in the direction of heavier cars, freight cars especially, heavier loads and higher rates of speed, and we shall soon have to enlarge our car axles, journal included, and if so, should urge the Master Car-Builders' Association to adopt a larger standard. This Westinghouse train that has been alluded to has 50 cars, weighing 15 tons each; each car will be loaded with not less than 60,000 pounds, making 45 tons, sustained on eight small journals. We must have larger axles for safety. I have here a drawing of a proposed larger axle, without changing materially the present standards of journal boxes.

Mr. MARDEN (Fitchburg): When the National Association adopted what is known as the Master Car-Builders' axle they made a move in the right direction, but they did not go far enough, though many of the heads of departments thought it was extreme in size at that time. We have been ordering axles $4\frac{1}{2}$ in. dia. in the middle for some time, which is not too large, even for the present size of journal. The journal should be at least 4 in. dia. and 8 in. long, and the axle should be at least $4\frac{1}{2}$ in. dia. in the centre. The present length of the axle should not be increased.

Mr. CONEY: For the last 40 years axles have been made of scrap iron—30 years ago the best axles were said to have been made of horseshoes, supposed to be Norway and Swedish iron. To-day scrap axles are made in New England for $2\frac{1}{2}$ cents a pound. "Scrap" is anything a forgeman sees fit to buy. Many years ago the government used to call for rods and shafts made of fagoted bar—a bar of iron in the centre, and other bars outside of it and round it, drawn down under the hammer. An axle made of promiscuous scrap, bought here and there, you cannot tell much about; one made of

* From a paper by Alfred F. Brainerd, Birmingham, Ala., read at the Duluth meeting, July, 1887, of the American Institute of Mining Engineers.



HYDRAULIC CAR LIFT.—ST. LAZARE FREIGHT STATION, PARIS.

fagoted bar, of which you know the tensile strength and know that the iron is homogeneous throughout, is one that you can rely upon. In some tests of axles going on at the Watertown Arsenal they find that the best axle is made of horseshoes, and has a tensile strength of 70,000 pounds; some have 42,000, some 55,000. You cannot make 100 axles of scrap iron and have them alike; but if you make a fagoted axle you know just what you have got. Thirty years ago we made axles in this country with $3\frac{1}{4}$ in. journals for cars carrying ten tons or less. Now we are building cars for carrying 20 tons, and use $3\frac{1}{2}$ in. axles, which are not large enough for safety. What we want is an axle safe enough to carry any load.

Railroads now use an oil that allows 30 per cent more friction than an oil which can be had at a little higher cost. In order to run a railroad to the best advantage, the best materials should be procured, the best axles, the best composition of metal for boxes, and the best lubricators.

The PRESIDENT : I have put on to the blackboard a diagram of an axle in operation, designed by Mr. Johann, of the Texas & Pacific road.* It will fit into the Master Car-Builders' box, the internal arrangements of the two being the same. There is no key, none being necessary. The journal is $4\frac{1}{2}$ in. dia., beyond question as to strength. This axle can be used without changing any existing standard, and will carry any existing load. We have one very heavy tender running on that journal, and it has done admirably so far.

I will introduce to you Mr. Webber, who was formerly connected with the Chicago, Burlington & Quincy, and is now a mechanical engineer in Boston.

Mr. WEBBER : The Chicago, Burlington & Quincy has taken up the subject of axles, especially scrap axles, and made many experiments. Their method of making a test was to inspect a carload of axles, to reject such as had flaws in them that showed, and to take two from every 50 of the remainder and test them first by a falling weight, and then by cutting sections through the centre of the journal, then etching them with acid and printing from them. I have some of the prints here, which tell the whole story. Here is one taken from a piece of scrap axle; that shows the texture of the axle, the holes and imperfect places, the acid having eaten through the dirt and other impurities and left the iron. There is a print from a steel one, showing very little impurity. This led to using greater care in the selection of the scrap, and more thorough working of the axle. There is a print from an axle made of well-selected scrap, and very thoroughly worked, and the difference between that and a print from an ordinary axle is very perceptible. There are two made from new bar iron, fagoted iron. There are two prints from different parts of the same axle, one from the centre, which was worked the most, showing that working the metal has a tendency to refine it and bring it up more solid. There were also tests by bending, which we considered a good test, as also that by a falling weight. It was found that the best scrap-iron axle, that would stand the Pennsylvania Railroad test while it was warm from the test, if allowed to cool and apparently get rigid, would break at the first drop afterward. It was not so with steel axles at all, which could not be broken under the drop.

Mr. SHINN : Suppose you got rigidity in your axle by enlarging it, what would that element be worth if you increased your resistance to bending, say 25 per cent, what would be the difference in the value of your axle theoretically?

Mr. WEBBER : I should think the larger axle would be better than the smaller axle of higher tensile strength per square inch.

Mr. ADAMS : I don't mean to say anything that would be detrimental to scientific investigation, but I must say that I never had much faith in these tests. The New York Central and Pennsylvania make many tests, but have more axles broken than the Boston & Albany, though we never make tests. Our practice and experience lead us to buy our axles of parties whom we believe will do good, reliable work. If

* This journal-box and end stop were illustrated in the *Railroad Gazette*, July 29, 1887.

values his reputation will of course make his axles of good scrap. I suppose the more the iron is worked the purer it is, and we should expect to pay for the working if we wanted a good axle. If a man should offer us axles for $2\frac{1}{2}$ cents a pound we should refuse them, think them too cheap. Few master mechanics were in favor of the larger axle when the subject was first agitated in 1873; but they finally adopted the Master Car-Builders' standard. The business of the country now demands faster trains and heavier loads, and we must increase the size of the axle for safety. I should prefer to adhere to the Master Car-Builders' standard, if possible. That axle properly made, with $4\frac{1}{2}$ or $4\frac{1}{4}$ in. dia. in the centre, will carry 30 tons; we have carried 35 consistently with it. It seems to me that the ordinary merchandise carried between the East and West does not require loads of 80,000 lbs., as some say they carry. Coal or iron may be carried that way, but the average of other freight would not be over 10 tons a car. Then why should we build cars for ordinary business to carry 80,000 lbs.? The average tonnage of freight that comes in on our road is about eight tons to the car. It is economical to carry coal in 25 or 30 ton loads, and we want large axles for that; but I should not put such an axle under an ordinary merchandise car.

The PRESIDENT : We must have an axle strong enough not to break, even if the material is not the finest. We must have a larger axle, and I think Mr. Johann struck the keynote when he fixed upon that plan, with journal of the size shown in this diagram. He does not change thing, as far as the present standard is concerned, except to make a new the axles made of scrap iron are not all alike. You can't tell much about them by testing one or two. A good maker who axle box and that is a small matter. I don't think that a large journal is so liable to heat as a smaller one, and that size, $4\frac{1}{2}$ by 8 in., will wear longer with less friction, and seems to me better than anything we have had before.

Mr. COLEMAN : The larger the journal the less trouble from heating and cutting the boxes. Much of the trouble with car bearings is due to the small diameters and insufficient wearing surface. Some roads will not buy as good axles as the Boston & Albany does, and they should be large to meet the difficulty arising from the use of poor material. The increased traffic on our roads is to be met by a greater number of light cars, run at much higher speed, rather than by increasing the size of the cars and the loads. High speed in freight trains can only be accomplished by making the machinery of the cars as fine in every particular and as accurate and as good in every way as that of the tender of a locomotive. It must be in first-rate order to run economically. We shall improve our trains by improving our whole method of making the running gear.

Mr. HOWARD (Engineer of Tests at the Watertown Arsenal) : We are engaged at the Watertown Arsenal in testing structures and materials. There are certain stresses to be resisted by a certain amount of material. We have the problem of the axle to find out what those stresses are, and the ability of the material to resist them. It is easy to ascertain what the stresses are in a static manner—that is, those which affect the axle when not in motion—but it is somewhat difficult to tell just what the maximum stresses are when it is running. We have been testing some axles for the Boston & Albany road with a view of ascertaining whether there was any structural change which the material underwent. The last one we tested had run nearly 200,000 miles, and there was not found to be any change in its properties shown by the tensile test. The question of alternating stresses, from tension and compression is one which comes into the investigation of axles. We have not tested any axles which did not show a large amount of ductility; they stretched from 15 to 18 per cent, before they showed any tendency to rupture. Any one would judge that a steel axle is better than an iron one. High strength does not necessarily give the best qualities for an axle, though in many cases it would. In the case of steel, a fine crack once started in an axle will extend with rapidity, especially with cold-rolled metal. We have met with a good many cases of brittle fractures in steel, and have found that notwithstanding this brittleness, the metal could be bent cold,

with the brittle surfaces still in the specimen, which shows that steel of good tough qualities may at times break; and it is my impression that fibrous material is best adapted to resist those sudden breaks, because the want of continuity of material assists those fine cracks which sometimes occur. It would seem then that an axle might be made which would have only one dangerous section, which would be at the junction of the journal with the larger part of the axle, which is the place where these fine cracks commonly commence. These incipient cracks can be detected by inspection, if the inspection is often enough. One or two tests have shown that the elastic limit of axle material is very much reduced by a moderate amount of heating; and the elastic limit of an axle made of soft material would run down to a dangerous point. The higher the elastic limit, the greater the load the axle will endure, without passing the elastic limit either on the tension side or the compression side.

Mr. CONEY : Is it not the case that in testing a fagoted axle in different places you get very nearly the same condition, but if you test a scrap axle in different places, you find a variation? That is, an axle made of homogeneous iron ought to be nearly the same throughout.

Mr. HOWARD : In one instance of a scrap axle which was ruptured near the surface, we found a decided difference between the strength of the metal at one end and that of the other; the fractured end being the weakest.

Mr. CONEY : Is it true that it hurts steel to hammer it?

Mr. HOWARD : The effect of hammering it is to increase its tensile strength; we have met with no instance where hammering diminished its tensile strength. It increases its limit of elasticity, and is accompanied by a loss of ductility. You can judge for yourself whether it would be improved or injured for any purpose by that treatment.

Mr. BROWN : Is it a proper thing to do to play the hose upon a hot box to cool it?

Mr. HOWARD : I think that would not be a proper thing to do. The stresses upon the material ought to be as uniform as possible. The outside fibres will be the most strained by such treatment, and if you have initial strains on top of the initial strains which come from the load, it would overstrain the material.

Mr. ADAMS : Suppose we were running a train to Boston, and when 20 miles away we found a hot box, red hot, and we could not stop to cool it, except by putting water on it, and we cool it as quickly as possible, in order to get in. Now, should we run any risk in using that axle again, after this sudden cooling?

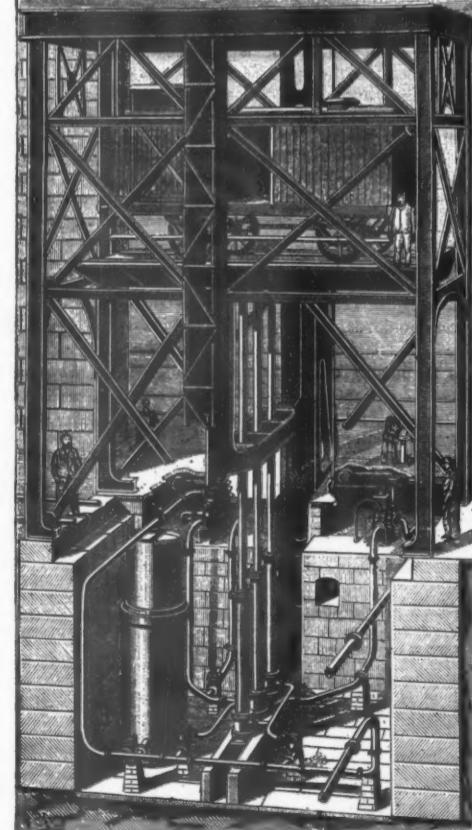
Mr. HOWARD : I think in that case there would be an initial strain caused there, and it would remain there until the metal was brought to a high temperature again, and slowly cooled, but you would run the risk of warping.

Mr. ADAMS : An axle treated in that way after being so heated in running, would be safer than if not treated so?

Mr. HOWARD : I think so.

Mr. ADAMS : Do I understand that an axle can be run 250,000 miles without anything being done to correct any initial strain it may have, without any change in its strength whatever.

Mr. HOWARD : In the case I mentioned we did not notice



Hydraulic Car Lift.—St. Lazare Freight Station, Paris.

that the axle was affected. That does not show that every axle could do this. It shows that those particular axles were large enough to do this without injury.

Mr. ADAMS : We have entertained the idea that an axle deteriorated by long use, and that led to an order on our road that no axle should be allowed to run over 200,000 to

250,000 miles. Now, if your investigations show that there is no deterioration, it would be safe to run longer?

Mr. HOWARD: There are certain stresses the material is capable of enduring for definite period, and we are endeavoring to find out the limit of those stresses. A very light load would not ever produce a change, but certain high loads apparently do; and, unfortunately, the stresses come alternately, first one of tension and then one of compression, and that is the most dangerous kind.

Western Railroad Club.

LOCOMOTIVE SMOKE-BOXES AND FIRE-BOX ARCHES.

The monthly meeting, held at the Grand Pacific Hotel, Chicago, Wednesday, Nov. 16, was an unusually large and interesting one. The opening paper on "Extension Smoke-Boxes and Brick and other Fire-box Arches" was read by John Hickey, General Master Mechanic Milwaukee, Lake Shore & Western road.

He said that to consider the subject exhaustively would involve the discussion of many scientific points relating to combustion; therefore he would confine himself to its simplest bearings. From the earliest history of the locomotive we have seen many mechanical means to avoid spark throwing and the black smoke nuisance. To accomplish the desired ends and at the same time to maintain a blast that would develop heat to generate sufficient steam and to enable the locomotive to perform the necessary work within a given time, a much larger grate area than any now in general use for locomotive fire-boxes would, to a large extent, cure many of the evils. The fuel generally used is bituminous coal, whose composition is, substantially, 80 per cent. carbon, 5 per cent. hydrogen and 15 per cent. earthy matter. He would deal with but two of these, solid carbon, represented by coke and hydrogen or gas. The gas from a ton of coal requires 100,000 cubic feet of air for its complete combustion, while the carbon requires but 200,000 cubic feet. Thus the gaseous matter of the coal requires one-half as much air as is required by the solid coke. To get full heating value from bituminous coal on limited grate area, accurate provision must be made to supply the necessary air for the combustion of the generated gases; the coal must be supplied to the fire with such regularity and carefulness as to permit this; the artificial draft created by the exhaust must be such as not to draw the fire-box currents through the flues at too high a velocity, or that its effects on the fire must not be such as to permit the admission of too much air, thereby cooling the gases below an igniting temperature which would enable them, the cream of the coal, to escape unconsumed. Economy of fuel was the object sought by the invention of the fire-box arch. Its position in the fire-box retarded to some extent the currents and gases after leaving the fire and assisted largely their chemical combination and consequent combustion before entering the flues. The fire brick also becomes heated to such an extent as to prevent the gases being readily cooled below an igniting temperature, as well as maintaining a more even and regular fire-box temperature. The extended smoke-box having a length from the flue sheet to the smokebox front of not more than $\frac{2}{3}$ times the length of stroke and a diameter equal to the circular part of the boiler, is the twin sister of the fire-box arch; and while it is not claimed that its pressure has any direct part in combustion, together with its attachments, it has no inconsiderable part to play in connection with the struggling forces engaged in the fire-box, flues and smoke-box of a locomotive when performing heavy service. The deflector plate, from its location in front of the flues, partly governs the heated currents arising from the fire, and regulates their passage through the tubes. The wire netting should be placed below the exhaust nozzle, its mission being to restrict the exit of all cinders. The high exhaust nozzle delivers its currents into a straight open stack, thereby creating in the smoke-box a very regular and at least a good partial vacuum, and manifesting its advantages on the fire by the reduced amount of black smoke emitted. The expense of applying the extended front is \$140 per engine. The cost of fire-brick arch is \$6, and average wear six months. By the addition of these devices the additional dead weight put upon the truck is about 900 lbs. In the discussion which followed, Messrs. Swanston, Master Mechanic Pennsylvania Co.; Shackford, Chicago & Alton; Mackenzie, Superintendent Motive Power, New York, Chicago & St. Louis; Verbrück, Chicago, Rock Island & Pacific; W. H. V. Rosing, Illinois Central; Forsythe, Chicago, Burlington & Quincy; Barr, Chicago, Milwaukee & St. Paul; Peck, Western Indiana; and G. W. Rhodes, participated. Mr. Shackford explained a device invented by M. M. Wilson, of the Chicago & Alton, as a substitute for extension fronts.

The second paper was by W. L. Brown, chemist of the Chicago, Burlington & Quincy, on "The Relative Strength of Sap and Heart in Norway Pine, especially relating to Sills of Freight Cars." Mr. Brown gave a résumé of a series of tests on the subject, illustrating the same by elaborate tables of statistics. His deductions were to the effect that while the sap showed the best result in tests of compression and tensile strain, the heart was far superior in durability and other features. Messrs. C. A. Schroyer, Chicago & Northwestern, Verbrück and Swanston participated in the ensuing discussion.

On motion a committee consisting of Messrs. Verbrück, S. Hickey and Hickey was appointed to prepare a report on standard axles for 60,000-lb. and 40,000-lb. cars; also on journals with and without collars. The Johann journal box was exhibited in model. Mr. William Forsythe, of the Uniform Steam Heating Coupler Committee, reported that a meeting of representatives of all the railway clubs (New Eng-

land, New York, Central and Western) had been appointed at Buffalo Nov. 30.

President Rhodes announced that Mr. Willard Smith would read a paper on steam heating at the Club's next meeting.

Hydraulic Machinery for Freight Stations.

Many of our readers will remember more or less distinctly the series of papers on the Forth goods stations, Newcastle-on-Tyne, and the use of hydraulic cranes and capstans, which was published in the *Railroad Gazette* in April, 1882. These papers showed the wonderful ease and quickness with which loaded freight cars are handled in English stations by the use of hydraulic machinery, and they were accompanied by drawings of the apparatus used for moving, loading and unloading cars on one level. But it is often the case that to economize room the English stations are built in two or more stories, and cars and heavy freight are transferred from one level to another by hydraulic lifts. This system is also used considerably in France, and the illustrations here given show an elevator for cars in the St. Lazare station in Paris. They are reproduced from a late number of *La Nature*, to which journal we are also indebted for the description. The station is in two stories. The first is at the track level and the second at the level of the street Rue St. Petersburg. On the first floor are four hydraulic cranes, each of about 3,300 lbs. capacity, and one crane of a capacity varying between 6,600 and 11,000 lbs. There are on this floor also six hydraulic capstans worked with a pressure of about 700 lbs. per square inch. The second floor at the street level has an area of about 54,000 sq. ft. There are 12 tracks and two hydraulic transfer tables, one for locomotives and one for cars. On this floor are nine capstans. There are four elevators, two for cars and two for freight. One of the former is represented in the illustrations. The boilers, engines, pumps and accumulators are placed in a separate building. The engines are of 145 horse-power nominal, and about 2.36 pounds of coal is consumed per horse-power per hour. The pumps are direct acting, 23.6 in. diameter, and work at about 50 strokes per minute. There are two accumulators of about 200 gallons capacity each. The load on the piston of each accumulator is nearly 84 tons. The pipes are tested to 1,400 lbs. per square inch, which is about twice the service pressure which they carry.

The elevators for cars weigh nearly 17 tons each. Each has three pistons. The platform is $10\frac{1}{2}$ by $29\frac{1}{2}$ ft. and has one track. The vertical lift is $31\frac{1}{2}$ ft. The elevators work at about 3.28 ft per second and about 80 movements are made per hour; that is, 40 up and 40 down.

The capstans have three cylinders each, and work at a maximum speed of 5 ft. per second with a tractive force of 880 lbs. They may be reversed for examination, etc., but when in the normal working position only the capstan proper is above the floor level.

TECHNICAL.

Locomotive Building.

The Canadian Locomotive & Engine Works, Kingston, Ont., have a contract from the Dominion Government for 14 locomotives for the Intercolonial.

The Tanner & Delaney Engine Co., of Richmond, Va., has changed its name to the Richmond Locomotive & Machine Works. A large number of special tools have been added to the plant, and the company announces itself prepared to build the latest designs of light locomotives, engines and boilers.

The Car Shops.

The Merchants' Dispatch Transportation Co. has given orders for 500 cars to the Michigan Car Co.

Contractor Leonard, of the Wyatt Park Cable road, St. Joseph, Mo., will receive bids for furnishing 16 cable cars of the style now in use in Chicago.

Bridge Notes.

The Wrought Iron Bridge Co., of Canton, O., has been awarded the contract for the construction of a bridge over the south branch of Black River, at Watertown, N. Y., and also a contract to build a bridge between Verona and Rome, N. Y.

The King Iron Bridge Co., of Cleveland, O., has been awarded the contract for the construction of a bridge over the north branch of the Black River at Watertown, N. Y.

Bids are requested for a bridge of 11 spans, of 20 ft. each, across Platt River, in township 1, south, Colorado. Address Clerk Board of County Commissioners, Court House, Denver, Colo.

Bids are requested for two iron bridges with stone abutments in Milford and Farmer townships, Defiance County, Ohio. Address Wm. T. Hill, County Auditor, Defiance.

The county commissioners will build a bridge at Eau Claire, Wis. Cost, \$25,000.

The county commissioners of Wake County will build several iron bridges. Address S. J. Allen, Chairman Board of Commissioners, Raleigh, N. C.

A bridge will be constructed over the Youghiogheny at Suterville, Pa. Cost, \$50,000. Address W. L. Scott.

A bridge will be constructed over the Ohio River at Martin's Ferry, O. Address R. H. Cochran, Toledo, O.

The county commissioners will build a bridge at Seymour, Ind.

The King Iron Bridge Co., of Cleveland, O., is building new shops capable of a yearly output of 15,000 tons.

The Masillon Bridge Co., of Masillon, O., has recently accomplished or has under way the following work:

Fourteen hundred feet of iron truss bridges, in spans varying from 100 to 160 ft. long, on the Cleveland, Columbus, Cincinnati & Indianapolis; just completed.

Two spans of 125 ft. each on Indiana & Illinois Southern, over Amherst River.

Two spans of 134 ft. each on the Louisville, Evansville & St. Louis road.

On the line of the Indiana, Bloomington & Western the company is to put up 350 ft. of iron truss.

Highway bridge across the Desplaines River at Joliet, Ill., 240 ft. long.

Highway bridge at North Manchester, Ind., 280 ft. in length; now under way.

Grand Rapids, Mich., highway bridge, 70 ft. wide and 80 ft. long.

Wayne County, Ind., two highway bridges of 125 ft. each. The works of the company are being run night and day.

Manufacturing and Business.

The Electric Compound Boiler & Power Co. has been organized in Portland, Me., for the purpose of manufacturing boilers. President, Wm. E. Plummer. Capital stock, \$100,000; amount paid in, \$400; par value of shares, \$10.

The Thomson-Houston Electric Co. are building an extensive addition to their works at Lynn, Mass.

Iron and Steel.

A contract for cast-iron water pipe for the town of Lake, a suburb of Chicago, was awarded last week to the Shunkle, Harris & Howard Iron Co., of St. Louis. The terms are \$29.74 per ton of 2,000 lbs. of 24-in. pipe, to be delivered as fast as required by the board. The length of pipe needed is about 27,000 feet and it will cost \$95,000.

A. M. Fletcher, George F. Brannah and J. Hendricks, all of Indianapolis, are making inquiry preparatory to placing an order for over \$100,000 worth of wrought iron pipe, to be used in piping natural gas.

The buildings of the East Buffalo (N. Y.) Iron Works will be completed before the first of January. The main building will be 80 x 325 ft.; machinery building, 50 x 150; cupola building, 35 x 52, and boiler-house, 40 x 82. A 28-ft. crane in the main building will enable the company to handle the largest castings.

The Bowling Green Rolling Mill Co., Youngstown, Ohio, has all the buildings completed for its plant and is now putting the machinery in. The plant will consist of a 9-in. and an 18-in. finishing mills, 20-in. muck mill, ten puddling furnaces and two heating furnaces.

The Duquesne Steel Works, 12 miles up the Monongahela River, from Pittsburgh, Pa., will begin operations Dec. 1 with sixty men, and will produce 100 tons of pipe per week. The product will chiefly be steel boiler tubes and lap-weld wrought-iron tubes. Two bending and a welding furnace will be erected.

The Pueblo Steel Works, at Bessemer, Col., continue to be operated to the fullest extent of their capacity. The works employ at present between 600 and 700 men. The steel department is turning out standard gauge steel rails for the Colorado Midland Railroad to be laid on the Aspen extension.

The now-billed mill of the Pennsylvania Steel Works will soon be ready for operation.

The Rome Iron Works, of Chattanooga, Tenn., have put up another large cupola and crane for use in the manufacture of steel by the Bessemer process. This will increase the capacity of the plant about one-third and will enable the company to turn out rails much faster than heretofore.

A license of incorporation under the laws of Illinois has been granted to the East Chicago Rolling Mill & Iron Co., of Chicago; capital stock, \$750,000; object, to conduct or operate one or more rolling mills, etc.; incorporators, F. W. Rice, J. W. Nye, E. L. Lamb.

The Stover Manufacturing Co., of Freeport, Ill., has put in operation the new foundry which has just been added to their works. The new building is 250 by 60 ft. in area, with a high bridge-roof, well lighted and ventilated. It will be used exclusively as a molding and casting room for the manufacture of light castings. It is equipped with a six-ton Collier cupola. The company start in with 52 molders, but all told 75 to 80 men will be employed.

The Rail Market.

Steel Rails.—The meeting of steel rail manufacturers was held in Philadelphia on Nov. 15, and it is said that everything was harmonious, and there is every prospect that remunerative prices can be maintained. It is thought that \$31.50@\$33, at mill, will be bottom rates in the East. The opinion at the meeting was that the demand for 1888 would be quite large, and that \$33@\$34 will be average quotations.

Old Rails.—The market is firmer, and holders are waiting with the expectation of better prices. Prices are quoted at \$22 for tees and \$22.50@\$23 for double heads.

Scrap.—Sellers are asking \$20.50@\$21 for No. 1 American wrought scrap from yard. No business is reported in foreign scrap.

Track Fastenings.—Quotations: Spikes, 2.25@\$2.40c.; angle bars, 2.05@\$2.15c.; bolts and nuts, 3@3 25c.

Westinghouse Brake Trials on the West Shore.

The West Shore Railroad Co. announces that the Westinghouse Air Brake Co. will make a series of tests with its train of 50 freight cars on the West Shore road near Ridgefield Park, N. J., on Nov. 21. The invitation states that special trains will leave Jersey City (Pennsylvania Railroad station), at 1:45 p. m.; New York, Jay's street, at 1:30; New York, 42nd street, at 2:00, and Weehawken at 2:05.

An Iron Monopoly in Germany.

The agreement between the rolling mills of Germany for the purpose of reducing the production and advancing prices has resulted in the formation of a ring that possesses a monopoly of the rolled iron business. Prices are already 50 per cent. higher than in England.

Uniform Couplings for Continuous Heating.

Representatives of the leading railroads centring in New York met at the Astor House on Nov. 16 to organize for the purpose of adopting a common coupler for the continuous method of heating cars by steam. If this system is generally introduced it will be necessary for the roads to have a uniform system, so that the cars of one company can be coupled with those of the others. No definite action was taken, but a sub-committee was appointed to take steps for furthering the project. Among those present were Messrs. Buchanan (New York Central); Vogt (Pennsylvania Railroad); J. W. Cloud (New York, Lake Erie & Western); H. Stanley Goodwin and John Kinsey (Lehigh Valley); J. C. Blackall (Delaware & Hudson); Griggs (New Jersey Central); Mr. Casavane (Pennsylvania Co.); and Mr. Edward B. Wall (Pittsburgh, Cincinnati & St. Louis).

Traveling Electric Light Apparatus.

Another useful application of the electric light in railroad service has been lately introduced in Europe in the shape of an electric light apparatus, which can be moved to any portion of the line where sudden pressure of business may render the assistance of a powerful light desirable in night work. Such an apparatus, which may be found useful in construction or for military purposes, has been lately tested at a station in Vienna. It took 9 hours to set the whole electric plant in working order. The power to run the dynamo is furnished by a "locomobile" of 8 horse-power. The number of arc lamps is 8, and as many incandescent lamps are provided for giving light to the operators. The lamps are carried by light bamboo poles, and each suffices to light a circle of about 150 yards diameter. Sufficient light is furnished for a section of road of from 400 to 1,000 yards.

Mexican Notes.

It is reported in Vera Cruz, Mex., that English capital has been raised for a railroad which will start from the line of the Vera Cruz railroad and run through to the Pacific coast, terminating at Acapulco, thus affording an interoceanic route wholly under English control.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN OPINIONS, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The Master Car-Builders' Association have taken another important step toward the general adoption of couplers that will automatically couple with one another, and invite inventors to submit full size couplings for examination and test at Washington. The names of the various couplers that comply with the tests, and couple and uncouple efficiently with the standard coupling of the Association, will be announced officially by the Association.

There can be no doubt that when this point is settled the process of equipping cars with one or other of the various couplers of the Master Car-Builders' type will proceed more vigorously. The consequent saving of life and limb should be a sufficient inducement to railroad corporations to push forward with the change, especially as the greater facility in starting heavy trains and the diminution in broken drawbars will effect an important pecuniary saving and enable trains to be run with greater regularity and safety.

It is difficult to estimate the enormous improvement on present conditions that will be effected by the abolition of slack, with its accompanying loose links and pins, and the general adoption of a uniform type of automatic coupling on freight cars.

The Baltimore & Ohio, Illinois Central and Zanesville & Ohio River roads are announced as having adopted the combined per diem and mileage system for car service. An interesting letter from a correspondent, whose writings are familiar to the readers of the *Railroad Gazette*, touching upon some phases of the car service question and telling of the doings of the Trunk Line Committee on that subject, will be found in another column. The "sense of fairness among railroad officers," referred to by our correspondent, is often sadly clouded by immediate and perhaps narrow pecuniary considerations; but if it could be foreseen what great possibilities in the line of better movement of cars and the consequent smaller stock of them necessary to be maintained, are involved in this reform, there is little doubt that the possible present losses would be made to appear comparatively insignificant.

The action of the oldest transcontinental line in accelerating the passenger train speed between Omaha and San Francisco causes a fluttering all along the line. The Chicago, Burlington & Quincy feels under the necessity of supporting the Denver & Rio Grande, and proposes to quicken its time to Denver enough to enable passengers to reach Ogden as quickly as over the Union Pacific. This affects Omaha and Kansas City traffic, and so a half dozen other roads are at once interested. The Northern Pacific is reported as having decided to shorten the time of its transcontinental trains to match the Union and Central, but the Atchison and other lines south of the Burlington are said to be trying to prevent the threatened wholesale hurrying-up. The proposition to run a second through first-class passenger train every day seems to have

been abandoned by the Union and Central lines. A general reduction of time between Chicago and Omaha would quite likely affect the lines east of Chicago, though the latter would perhaps act on the general rule among railroads in these matters that might makes right, and insist on dictating the time of day for making connections. The time, even after making all the changes talked of, will not be fast, and would very likely have been shortened long ago but for the fact that the distance of Chicago from Omaha and of each of these places from the seaboard termini has made the connections come quite naturally either in the morning or evening. Travelers do not want to arrive anywhere either late at night or very early in the morning, and a portion of a day is often nearly as valueless to them as a portion of a night; thus it is generally the case that no one link in a line of roads desires to shorten a train's time unless a saving of ten or twelve hours can be effected; but if all will act in concert a material improvement can easily be made. It is quite possible that some of the longer lines may make reductions in fares instead of shortening time; this is a time-honored method of warfare and one which in some respects affords more interest to the warriors.

The problem concerning local freight rates in Illinois, which is now occupying the attention of the roads extending from Chicago south and southwestward, furnishes a typical illustration of the operation of the fourth section of the Inter-state Commerce law, and one may here see the principles on which the law works in numerous other cases where the conditions are not so simple.

These roads—and it is to be remembered that numerous others which run east and west and extend into Indiana are in the same dilemma—have rates for traffic wholly within the state which are regulated by a state law; competition compels them to make rates on inter-state traffic very much lower than these; before the enactment of the long and short haul law these low rates could be confined to competitive points and possibly varied at these points according to the intensity of the competition; but now numerous local stations enjoy the advantage of them, so that a Chicago wholesaler can perhaps sell goods cheaper at a town in Iowa than he can at a place in his own state near the Iowa line; while places midway between Chicago and St. Louis are enabled to buy in the latter place more favorably than in the former, simply because St. Louis happens to be beyond the state boundary. Since April 5 many of the general freight agents have spent their days and nights apparently in an effort, not to make rates according to any rule or system, but to fix each one, after a search among all the others that can possibly influence it, at a figure just within the law. It would seem natural and sensible to have general rules for making rates, to have as few of them as possible and to have each apply to as wide a range of cases as possible; but the actual practice has been more like that of the maker of artificial limbs or the fat man's tailor who makes a special pattern for each customer. The circumstances again illustrate the all-prevailing fact that where a clear saving of a dollar or a cent can be accomplished, rules and scales, systems and plans have to be laid aside.

The annual report of the Boston & Providence, printed on another page, gives some particulars concerning the proposed lease which had not appeared in the accounts heretofore published. The statements are still indefinite, however. The cost of the Bussey Bridge disaster, which everybody knew to be over \$400,000, is still undetermined, many claims being still unsettled; the payments thus far have been provided for by borrowed money, the amount of notes payable standing now at \$760,000. The amount of the bonus to be paid by the Old Colony is given as \$800,000 larger than heretofore, and the "debts, obligations and contracts" of the company are to be assumed by the lessee. This would seem to increase the fixed charges which the Old Colony is assuming by a large percentage, and if it is willing to pay this price, the present rate at which the Boston & Providence stock is selling, 247, is readily explained. The annual meeting of the Boston & Providence on Wednesday authorized the directors to borrow \$2,000,000 to take up the floating debt, and approved by a large majority the proposed lease.

The elimination of a single class of accidents by the use of automatic freight train brakes, which is discussed in another column, is only the beginning of the possible economies which will follow the wide use of such an appliance. A study of the accident record would show large numbers of derailments and rear-

butting, and crossing collisions which would never have happened if the train at fault could have been stopped within anything like the short distance in which the new Westinghouse brake does the work.

The fact that there are so many freight train disasters in which the men jump off in safety shows that the tremendous momentum which so often destroys a dozen cars, more or less, is the result of weight more than speed, so that braking power adequate to the load is the chief remedy needed. Accelerating speed because there is a powerful brake will be done more or less when power brakes have been put in use, and this will of course neutralize some of the advantages which would be otherwise enjoyed; but it is to be remembered that the heaviest trains must continue to run at low speeds, except on down grades, for the reason that engines are commonly loaded so near their limit of capacity that high speed is out of the question.

While the great saving in life and money to be made by the introduction of continuous freight brakes will be found in the diminished number of train accidents, there are still other advantages to be thought of. That any man should seek to earn a living as a freight brakeman is another illustration of the well-known fact that there is no pursuit so uncomfortable or so dangerous that men cannot be readily found to follow it. The winter casualties among brakemen must equal those of an army in the field in a pretty severe campaign, and the exposure and suffering are nearly as great. It will not be many years before that railroading which forces men on to the tops of trains in dark, cold and slippery nights will be looked on as barbaric. It has been a necessity in the past, but it is no longer. An old railroad superintendent lately said: "If I were a brakeman or freight conductor I would move for a mass meeting to be held to insist upon the immediate adoption of this now perfectly practicable method of preventing the loss of life."

The Westinghouse brake tests for the benefit of the railroad men of New York and vicinity will take place on the West Shore road, at Ridgefield Park, N. J., about ten miles from Jersey City. The joint announcement of the railroad and the brake company will be found in another column.

Continuous Steam-Heating.

The work of equipping passenger cars with the numerous systems of continuous heating now before the railroad public is progressing apace.

Experience has already conclusively proved that a very small amount of steam will heat a train, and that even if live steam be exclusively used the amount of fuel consumed for heating purposes will be considerably less than that burnt in the old cast iron stove. In all probability this winter will demonstrate that the saving in fuel and attendance will more than counterbalance the repairs and maintenance of the coupling and hose between the cars and the extra first cost of the more perfect and safer heating apparatus.

It is fortunate that the great question of economy is thus virtually settled, and, indeed, at present the subject seems to present but two really formidable difficulties. The arrangement of the pipes inside the car, the means of securing a circulation and the best methods of permitting the escape of the contained air and the condensed water are simply the ordinary problems of steam heating, and are not presented in any very novel or specially complex form. The really difficult points which require solution are novel. It is not easy to devise a satisfactory coupling, and the problem of keeping a car warm while the engine is detached is one that presents peculiar difficulties.

A reservoir of hot water or other fluid must be under pressure to be of any use, and in an accident might injure the passengers by scalding, which is generally considered almost as painful a process as roasting. A burst reservoir in the baggage car would not, however, injure the passengers in the comparatively uninjured passenger cars, and in this respect would be less destructive than the stove.

While this method would possibly prove satisfactory on local trains, where long delays would never occur, it would probably be found insufficient in main line service, for it seems doubtful whether any such reservoir would hold heat for more than three or four hours when the outside temperature was at zero. In the event of an engine being stalled in a snow drift, and obliged to draw the fire, probably no reservoir yet proposed would keep the cars comfortable through the night. The only other alternative would appear to be some form of stove containing fire and intended to be only used as a reserve in cases where the continuous heating was not available. The only objection to this plan appears to be the possibility least it should in practice be used daily, and the

continuous heating only occasionally. It is evident that for some time to come the use of continuous heating apparatus will often be interrupted because an express or baggage car or the engine is not fitted with proper pipes and couplings. The danger that a difference in the couplings will often prevent some of the cars in a train being heated from the engine is one that is self evident, and it is gratifying to notice that energetic steps have been already taken to secure uniformity in couplings. It is, however, evident that in any system of continuous heating, efficient provision must be made for independent heating whenever the continuous system cannot be used.

Warned by the car-coupler question, which for want of concerted and united action was allowed to drift for half a century, and cause unnumbered deaths and an amount of pain and suffering and needless waste which can never be correctly estimated, the leading railroads have taken prompt steps toward securing a good and uniform coupling applicable to the different systems which use the continuous principle of heating cars. The Western Railroad Club took action in the matter some time ago, and the mechanical representatives of the leading trunk lines centering in this city have pledged themselves not to take independent action in the matter and not to adopt any coupling without mutual consultation and agreement. A sub-committee has also been appointed to investigate the question and test the merits, etc., of the numerous different styles of couplers proposed. This desire to act in concert on a matter where divided counsels would be fatal to the success of the safe principle of heating is, it may be hoped, a happy augury for the future, and may prove a precedent for many similar agreements to sink individual predilections and prejudices as regards rival inventions and practices, and secure the general weal by concessions to the opinions and experience of the majority.

The importance of combining heating and ventilation has been often urged in these pages, but few inventors seem to have taken advantage of the facilities for the introduction of a regulated current of pure and warmed air afforded by the general adoption of the principle of continuous heating.

Many admirable systems of heating are now undergoing trial, and both inventors and railroad officers are hard at work endeavoring to improve the apparatus and strengthen the weak places. The important points, the coupling, the method of keeping the cars warm while detached, and the combination of ventilation and heating, will, it is to be hoped, receive especial attention.

Telling is Not Teaching.

Railroading, like any other great business, has to be done by proxy. Stockholders delegate authority to directors, they to a general manager, he to superintendents (divisions and otherwise) and they to still others. A general manager or other high officer is supposed to know his business and to need only general directions; but engine runners, conductors and station agents, as well as employés in lower grades, have to be instructed more particularly; many of them are placed in positions of responsibility while their degree of attainment in necessary qualifications is still considerably below the ideal; and one of these who needs no training after he enters upon the duties of his place is exceptional. Men in higher grades (and to a large degree the best men in any grade) can be trusted to keep themselves posted, and to learn as fast as is necessary, without spurring from outside sources. Systematic instruction is needed also to secure uniformity, even where men are of the highest intelligence. Thus it comes about that railroads in general have the duty of telling large numbers of their men what to do and how to do it, and of seeing that the men understand what has been told them and that they all understand the same thing alike. This is generally done, at least in theory; but the cases continually coming up, of men who have not done as they were told to do, and who even dispute their superior as to what he has told them, give pertinence to the inquiry whether the blame for this evil is all on one side, and whether it is as irremediable as many seem to think it is. Hardly an accident happens from negligence or mistake, which the management does not show could have been prevented if its printed instructions had been rightly interpreted and followed. But however surely the blame may be fastened upon the subordinate, it still behooves officers to inquire whether or not they cannot lessen the losses of life and property in some way, even if their duty does not technically require it. Men who will not read and digest their instructions certainly are the chief culprits in any disaster following from the con-

sequent ignorance; but, this ignorance being a generally acknowledged fact, should not the superintendent or other responsible officer either make persistent efforts to cure the men's defects or get new men?

On every side we see officers who issue orders taking it for granted that a man who has in his possession a certain paper has read it, and that in addition to reading it he has digested its contents, so that he can treat it as part of his own mental equipment. But nothing is commoner than a careless reader. Not one person in a thousand can read a dozen sentences and then repeat the substance of them off-hand and do it correctly. Skillful teachers of children know very well that only by getting a pupil to tell in his own language what he knows can they feel sure that he really has understood what has been told him. Ideas must first be given out and then got back, the same as in sending a signal on an electric conductor. As we have just intimated, a large share of grown people are as unskillful in absorbing ideas as is the average child.

The last British Board of Trade report notes an accident caused by the negligence of a machinist who, in repairing some interlocking connections, omitted to properly warn the men and trains of his action. His instructions read that the distant signal must be left at caution and disconnected so that the man in the tower could not carelessly lower it, but the machinist disregarded this injunction. He doubtless had never been made to realize the true importance of that clause of the instructions. The Board of Trade inspector says "the rules are distinct on this point," which means that they are distinct to *him*. Is it to be supposed that they had ever been equally distinct to the machinist?

A road whose trains run on another company's track had the usual rule that engineers and conductors must keep themselves supplied with that other company's time-table and regulations; all at once it was discovered that these regulations had been changed and the men had *not* provided themselves with copies, and had been running more or less by guess for some time. Would a court or an intelligent jury justify a road in such a matter as this in leaving a dozen or a hundred men to post themselves without any supervision from their home officers? The *Pall Mall Gazette*, referring to the late Doncaster collision, says that the fireman of the train that ran past the red signal "had not the remotest idea" that the usual arrangements had been changed for the race week, although the company maintained that rigid printed instructions had been issued to trainmen. You can lead a horse to water, but you cannot make him drink, says the *Pall Mall Gazette*. Railroad officers ought at least to know which of their horses will be likely to drink and which will not; and in such vital matters as theirs the hostler should not only see the horses touch their noses to the water, but also know that they swallow some. In the matter of the new uniform code, superintendents themselves have to read its provisions with care, especially if they have been long educated in a different system, and have had no varied training in different codes; what right have they to assume that their less mentally active subordinates will master all the intricate points? And yet the new code is issued with hardly any attempt to test the men's appreciation of it.

The superintendent who compels conductors to respond to train orders by sending a new message of their own composition certainly has good evidence that the message has been understood and that the conductor has done some thinking on the subject, whatever disadvantages there may be in that system. And whatever modifications may be deemed necessary in practice this principle is an important one, and should not be lightly thrown aside. Until a man thinks about a matter his understanding of it is likely to be dim, however much he has read about it, so that anything that will tend to make men think should be carefully considered in giving an order. In a printed circular large and plain type help in this direction; so does intelligent arrangement of paragraphs and headings, and so does clear and simple language. To be compelled to read an order to an assistant aids in understanding it, one of the simplest principles of instruction being that to give out ideas, the imparting of them to others, helps to fix them in one's own mind; but the best of all ways to test a man's knowledge of a certain thing is to make him tell about it, orally or in writing, without any documentary aid. And his preceptor in this operation should be one who knows somewhere about ten times more on the subject than he does.

Hydraulic Freight-handling Gear.

Hydraulic gear for working freight stations has been largely used in England and her colonies and has been introduced on the continent of Europe. A description and illustration of a French installation

will be found on another page. Hydraulic power has been little used here because it has been feared that it would be affected by our severe winters, but when placed in buildings and properly protected, with the pipes laid in underground subways, there would probably be little trouble on this head. Hydraulic work requires most careful workmanship, for a slight leak wastes an incredible amount of power, and renders hydraulic working anything but an economical means of transmitting power. It is, however, obvious that if the leakage is small, the objection to using a comparatively expensive non-freezing liquid disappears. The return or exhaust liquid can be used over and over again, and a mixture of cheap spirits and mineral oil can be employed with considerable success. The use of a very high pressure, 1,700 to 2,000 lbs. per square inch enables a small quantity of liquid to transmit considerable amount of power, and reduces the size of the pumps, rams and pipes. A moderate pressure, about 600 or 700 lbs. per square inch is, however, generally adopted for hydraulic hoists and capstans. A small leak is not so serious, and the leathers and rams wear better.

It is probable that at least in the Southern states hydraulic power might often be profitably used without any special liquid, ordinary care being taken that the pipes, etc., were well protected. The pumps and accumulator being placed in an engine-house, near the boilers, could easily be kept warm.

The principal advantage of hydraulic power in a freight station is that it effects a considerable economy of space. It has therefore been chiefly used in freight stations situated in the heart of cities where land is very expensive. These stations may be arranged on two or more floors. The teamsters enter on the street level and unload on one side of a platform, the cars as usual being on the other. The cars are then moved by ropes worked by hydraulic capstans to the elevator which places them on the switching or yard floor, where the trains are made up. The switching may be partially or wholly done by hydraulic capstans, and in the latter case, the only work done by the locomotives is to haul the train away when made up. The switching yard is generally above the street level but may of course be beneath. Above is placed a warehouse in which freight may be stored. Access to the warehouse is provided by means of hydraulic freight elevators. It will thus be seen that on the same plot of ground are placed, one above the other: 1, a freight station; 2, a switching yard; 3, a warehouse, all in direct communication by means of elevators. A further economy of space is gained by using hydraulic capstans instead of locomotives for switching. A locomotive requires a clear road to run round a train or get out of the way of the cars, while with a capstan, the rope has simply to be unhooked and the capstan stopped. While a locomotive can only operate at one point at a time, several capstans can be working simultaneously and moving cars on different tracks and in different directions. The work of shifting cars is, of course, easier with the small four-wheeled cars used in Europe, where 12-ft. turntables can be substituted for switches, but transfer tables could be easily used in this country and, of course, would effect a great economy of space.

Hydraulic power is generally much liked by those who have used it, but probably in no other branch of machinery is the best workmanship and design so absolutely essential, making, in fact, all the difference between failure and success. Hydraulic power has the merit of being smooth and noiseless in action, and can be instantly started, stopped or regulated. While quick in working no excessive speed can be attained, while the high pressures used render it very compact. Hydraulic power can also be transmitted for a considerable distance, and a central pumping station will transmit power to small plants at distant points where space is valuable and the use of boilers would be objectionable. Several miles of hydraulic mains have been laid down in London, and no difficulty has been felt in working a large number of cranes, elevators, presses, etc., from a central pumping station.

The Cost of Breakaway Accidents.

A press dispatch last Saturday gave a few particulars of an accident of a sort which is very common. A freight train broke in two and then ran together again, making a bad wreck, which blocked for several hours the four tracks of one of the great roads running into New York. A similar accident is reported this week on another trunk line, involving the killing of a brakeman, the destruction of more than \$20,000 property and disarranging numerous suburban passenger trains for hours. That a fast passenger train did not run into either wreck may have been due to the block system in use on both roads, or such a complication may have

been avoided by mere good fortune; so long as passenger and freight trains are run at high speeds and as numerously as at present on all our large roads, the possibility of dashing into a wreck that has spread from an adjoining track always exists; but that question is not the one which we wish to consider now. It is rather the frequency of accidents of this kind, and the means of getting rid of them.

Unfortunately the statistics of this subject are very imperfect. Such as are obtainable have been collected entirely by individual enterprise, and ordinarily from unofficial sources. Still, we have the means of roughly estimating the proportion borne by accidents from trains parting to those from other causes, in number and in cost. From the *Railroad Gazette* accident records it appears that in 1886 16 per cent. of all the train accidents were of this class, and in 1885 14 per cent. But in the same years the accidents from unexplained causes were 55 and 59 per cent. of the total reported, and in all probability some of these were train-breaking accidents; derailments from this cause doubtless get reported as simple derailments. But we have it from excellent authority that in 1886 there were on a road which made about 11 million train-miles in the year, 692 train accidents. This road is quite up to the average in all the details of permanent way, equipment, administration and operation. In fact in some of these particulars it is above the average. Therefore deductions from its experience will be sufficiently near the truth to be interesting. If then there were 692 train accidents to 11 million train-miles, it may be assumed that there were 35,858 train accidents on the roads which reported 570 million train-miles in the last Poor's Manual. A similar comparison by mileage operated would give an immensely greater number of accidents for all the roads of the United States; but the comparison of train-mileage is far more just. Taking the total accidents then as having been 36,000 in 1886, 16 per cent., or 5,760, may be set down to the breaking in two of trains—about 16 a day.

The cost of the 692 accidents on the road which we are considering was \$57,000, not including the cost of freight destroyed. Considering the numerous cases of breaking in two known to every officer familiar with freight trains, this does not seem at all unreasonable. To be sure there are many breaks which entail no damage; but on the other hand it is to be remembered that the 692 includes all that did *any* damage; and of course there are hundreds of cases where one or two drawheads are broken which never get into the *Railroad Gazette* record, but which cost on the aggregate a good deal of money, nevertheless.

Of this \$57,000, over 14 per cent. (\$8,000) was due to accidents from broken trains. By the same process as that used to estimate the total number of accidents we find that for the United States the cost of this one class of accidents in 1886 must have been something near \$416,000. This, however, does not include damage to freight or loss from delay to traffic, and moreover it must be remembered that this road was not particularly unlucky; no one was killed in these accidents; a single case involving the derailment of a passenger train or the killing of one or more persons, such as any superintendent can call to mind, at once increases our \$416,000 largely and brings in the consideration of human life which should not be measured in money. But \$416,000 is five per cent. on \$8,320,000, which, at \$50 a car, would equip 166,400 freight cars with the air brake apparatus. This number is probably near 20 per cent. of the present number of freight cars in the country.

That an efficient automatic brake will pretty nearly do away with accidents from broken trains there can be no doubt whatever. The parting of the coupling is sure to apply the brake, and the brakes are sure to stop the sections of the broken train without collision. These are not matters of theory or conjecture, but of experiment, and have been demonstrated over and over again in the "breakaway" tests of the last two years, which have now become historical.

WHAT CONSTITUTES UNLAWFUL DISCRIMINATION.

The general result of six months working of the Inter-state Commerce law is that the short-haul clause amounts to less than was expected, while the provisions against discrimination amount to more.

When the law was first put into operation all these things were vague. The act was not explicit. In fact, it was not intended that it should be. Its promoters did not feel at all sure that they could pass any really definite measure of railroad regulation; and as a com-

promise they passed an indefinite one which each congressman was at liberty to interpret to suit himself, leaving it to the Commission to decide between conflicting views.

It was on the long and short haul clause that this conflict of views was the sharpest. Mr. Cullom asserted that it meant one thing; Mr. Reagan, with equal confidence, said that it meant something entirely different. The Commission had to settle not merely the general meaning of the clause, but the limits of railroad responsibility under it, and the character of the exceptions which were to be allowed. In all of these matters an interpretation has been adopted which is on the whole favorable to the railroads.

In the first place, it has been settled that the standard to which local rates must be reduced is the total charge for a continuous shipment, and not the *pro rata* share of that charge received by each individual road. This point was discussed at length in the *Railroad Gazette* for Jan. 21, and the action of the Commission has been precisely what was predicted at that time. In fact, we have become so used to this interpretation of the law that it seems difficult to realize that so many persons expected it to mean something quite different and far more stringent. But the Commission has in one respect done more for the railroads than we should have ventured to predict. Not only did they give a mild and conservative interpretation to the law, but they took special pains to exempt the railroads from anything like unfair responsibility under it. A railroad naming a through rate is not treated as though it were responsible for the amount of that rate. By accepting goods for shipment under that rate it simply incurs the obligation that its own local charges to or from intermediate points shall not be higher than the aggregate through rate, and that is all. A comparison between the Vermont State Grange case and the case of Allen vs. Louisville, New Albany & Chicago will show how strictly the responsibility is limited.

This general interpretation was sufficient to prevent the vast majority of railroad rates in the United States from being in any way affected by the law. But the attitude of the Commission with regard to possible exceptions to the general principle tended still further to lessen the conflict between the law and the previously existing railroad practice. In the matter of the petition of the Louisville & Nashville, the Commissioners stated that exceptions might be warranted in the case of competition with water routes, foreign or other railroads not subject to the provisions of the act, and rare and peculiar cases of railroads subject to the provisions of the statute. On the other hand, they said that such exceptions were not admissible in favor of through traffic as such, even though the local traffic might be somewhat more expensive to handle; nor as a means of building up certain localities and lines of business which would suffer in the absence of such discrimination.

The striking thing about this summary is that it so nearly agrees with what had already been the practice of the better railroads throughout the country. The great majority of the published rates were in accord with the short haul clause as thus interpreted by the Commission; and nearly every existing exception could be defended on those grounds which the Commissioners treated as admissible. The attempt to build up particular trades was not managed by local variations of tariff so much as by special rates to individuals or special systems of classification; and thus it did not come within the prohibition of the short haul clause.

But while the Commission were thus, by one series of decisions, narrowing the application of the fourth section of the act, they were giving a much wider effect to the more general provisions against discrimination in the second and third sections. At the time of the passage of the act these sections had attracted little notice. They were accepted almost without discussion. They were, in fact, simply a reaffirmation of well-settled principles of common law. Nobody opposed them because they were already law, independent of any act of Congress, but nobody thought that they were going to be very seriously enforced. If they had been disobeyed when they were common law, there was no reason to expect that their incorporation into a United States statute would give them superior authority. It was hoped that they would be used as a means of correcting flagrant inequalities of treatment between individuals; but few persons, we imagine, thought that they would be made an effective ground for the control of rates, especially as between different localities.

The earlier decisions of the Commission under the second and third sections have applied chiefly to passenger business. Some were decided in favor of the railroads, some in favor of the complainants,

but in all these decisions there is a noticeable readiness on the part of the Commissioners to take broad ground as to their authority under the act. Complaints under the long and short-haul clause have been dismissed because they lay outside of the scope of the statute. Complaints under the discrimination clauses have been decided freely, without the slightest question as to the scope of the act or the authority of the Commission. The line of action foreshadowed in the commercial travelers' cases was carried to its logical conclusion in *Smith vs. Northern Pacific*, where the issue of settlers' tickets at special rates was distinctly forbidden. This case was all the more noticeable because the practical effect of such settlers' tickets seems to have been unobjectionable, and there was at least a reasonable doubt whether there was not a real difference of circumstances and conditions within the meaning of the act. Low rates were given to *bona fide* settlers on principle, just as some railroads have given specially low rates to manufacturers' coal on principle, because the indirect gain to traffic seemed to outweigh any immediate loss. Yet the Commission actually went out of its way to declare such settlers' tickets illegal, when the individual case before them might have been decided without any such general *dictum*.

It remains to be seen just how far they will apply the same principle to freight classification. But if they do not it will not be for want of jurisdiction. They have already shown that they are not going to confine the application of the second and third sections to passenger business. In the case of *Keith vs. Louisville & Nashville*, they gave a broad interpretation to the requirement of equal facilities. In the case of *Board of Trade Union of Farmington et al. vs. Chicago, Milwaukee & St. Paul*, they have given a still broader construction to the requirement of equal rates. In the car-load and dressed beef cases they will soon be forced to define their position yet more clearly.

But how can the Commission expect to be strong enough to enforce equality under the statute when the courts have so conspicuously failed to enforce the same principles, though recognized as a matter of common law?

It is because the Commission understand the grounds and limits of such equality better than the courts have ever done. They do not attempt to base rates on cost of service. This has been their position from first to last:

"While cost, as has been said, is an element to be taken into account in the fixing of rates, and one of the very highest importance, it cannot for reasons well understood be made the sole basis, but must in any case be used with caution and reserve. * * * This is so well understood the world over that the propositions which have from time to time been made in other countries to measure the charges of the carrier by the cost of carriage solely, has always been abandoned after investigation." (In re Louisville & Nashville R. R. Co., I. Inter-state Comm., 63, 64.)

"If the different rates on the two routes worked no hardship or injustice to any one, there would be no occasion for corrective remedies, but when, as the fact was shown in this case, the producers and millers located in the petitioning towns and along that division are seriously injured, and their business disastrously affected by the double flat rates charged them, the public interests are concerned, and a case is presented demanding redress. These rates obviously preclude competition with the Minneapolis and St. Paul mills and those on the River Division. * * * The act to regulate commerce demands such adjustments of rates as shall not discriminate unduly in favor of the business of certain localities, and prove destructive to similar pursuits in other localities." (Board of Trade Union of Farmington et al. vs. Chicago, Milwaukee & St. Paul.)

The decision in the case last cited is almost identical in its effects with similar decisions in England; in its grounds and principles it is totally different. The final reason for enforcing the equality is that the traffic will not bear other treatment. Questions of cost are made an incidental means of determining the amount of inequality permissible rather than a criterion of the right of the railroads to act as they do. This distinction is important. It shows why the common law principle of equality may be successfully applied by the Commission when it has failed in the hands of the courts. Equality based on what the traffic will bear is a very different thing from equality based on cost of service. The general practice of the English courts—and of American courts, where they have seriously faced the subject—has been to establish a standard of rates based on cost of service, which could not be universally applied without causing widespread disaster to the business interests of the community. With decisions based on a false principle

(which was never really applied even in so simple a matter as turnpike tolls) it was impossible to build up any effective system of judicial regulation.

On the lines laid down by the Commission there is no such impossibility. They have rejected the principle which has failed and have adopted a much better one. They admit that charges may be based on value of service, or upon what the traffic will bear. But they attempt, on the ground of that very principle, to put a stop to the widespread abuses to which it has become liable. Charging what the traffic will bear has come to mean charging what the traffic will not bear. This is what the Commission is trying to stop. They admit the railroad principle, but they deny the right of the railroad agents or railroad managers to be sole judges of the application of that principle; and they undertake to limit the discretion of the railroads in cases where such discretion is likely to be abused. It would be too much to expect that the Commission should avoid serious mistakes; but their general principle is, we believe, the right one, and the only one which they could adopt. They deserve the sympathy and support of all far-sighted railroad men in their efforts to carry it out, and we have no doubt that they will receive such support.

They will probably need it. Though their undertaking is not by any means impossible, it is far more difficult than most people think. The skill of the Commission has been so successful in piloting it safely through the dangers which first attended it, that everybody—except probably the Commissioners themselves—underrate the difficulties yet remaining. But these are greater than those which have been already surmounted. Hitherto the work of the Commission has largely consisted in defining cases to which the law does not apply. Each opinion, as it was rendered, settled a number of varying points of practice, and precluded much possible litigation. To-day they are coming face to face with the work of enforcing the law in really doubtful cases; cases where it will not be enough to define the bearings of this statute, but where its subsequent enforcement will be a matter of great difficulty. There are to-day a number of cases where the act is more or less directly evaded. No one can pretend to know the amount of false weight or false classification practiced with the connivance of freight agents at the initial point of shipment. The present system of carload rates, while complying in general with the terms of the law, produces a great many discriminations which the law was designed to prevent. If the Commissioners decide in favor of its continuance, they will rouse much public clamor against them; if they decide that it is illegal, they will subject their authority to a very severe strain. Carload rates given openly are a much less serious evil than the special rates which they supplant. Moreover, they form a means of utilizing distributing centres as an element in railroad economy without actually violating the long and short haul principle. We know of no instance where special rates and carload discriminations have both been successfully checked at the same time. Whatever the decision of the Commission is, its indirect effects are going to be critical.

Finally, there is the general question whether rates can be maintained without pools. So far, they have been remarkably well maintained; but will this condition of things continue? When the law was first passed, railroads and shippers alike simply waited to see what would come of it. They suspended their previous quarrels in the presence of a new and unknown factor. But these quarrels were only suspended, not stopped. The maintenance of the *status quo* for a few months does not show that it can last forever. The percentages carried by the various trunk lines have changed very little; but there is no guarantee that this will continue. A single large shipper, by threatening to transfer his business from one trunk line to another, can force the former line to demand a differential on that particular class of business. When division of traffic was permitted, such demands had no force. To-day the railroads are helpless. The prospect of maintaining rates is equally bad, whether the trunk lines allow the differential or not. This is no imaginary case, but a serious, practical danger. Should rates become seriously demoralized, the difficulties of the Commission would be multiplied a hundredfold.

These are a few of the reasons why we regard the future with some apprehension. The Commission have declared their line of policy, and it is a strong one. But it still remains to be seen whether it is strong enough to overcome at present the difficulties by which it will be beset. However much we may desire its success, it would be wrong to shut our eyes to these dangers. We shall be much surprised if the next few months do not prove a most critical period

in the history of the Inter-state Commerce law, and one which will put the skill and wisdom of the Commissioners to the severest test.

Transportation and International Relations.

The most noteworthy examples of the relation of transportation with international questions are afforded by the routes from Europe to the far east, of which the shortest, measured in time, is the Canadian Pacific with its connecting lines of steamers. In distance the shortest line from England to India would be by rail to Brindisi, on the Adriatic Sea, and from thence by steamer through the Suez Canal and the Indian Ocean; but the high temperatures of this sea route, and the political divisions of the route by rail, make the longer way across the Atlantic and through Canada the quicker one. The English mail contracts with the steamers on the Suez route require a speed of only 11 knots per hour, while 16 knots are demanded of the steamers on the Atlantic and 14 of those on the Pacific portion of the Canadian route, allowing about 38 days to reach Shanghai by Brindisi and about 29 days by Vancouver. England, however, is no less anxious because of the Canadian route to secure the neutralization of the Suez Canal, and lacks, apparently, only Russia's acceptance of the articles of agreement. These, as drawn, prevent the canal's blockade in time of war or any combat within or near it, and place it in charge of an international commission, the most active member of which is the Khedive of Egypt. The canal has increased British trade with the east, but not in the same proportion as of the eastern trade of countries nearer the Mediterranean ports. The Canadian route will have a double value as a new line for commerce, and as a military highway to India, which, except upon the high seas, where England is still without a rival, lies within British territory.

Negotiations are also in progress for a shorter route to England from Cape Colony, by way of Lisbon and the "Eastern Express" over the continental railways. It will be necessary however for Portugal to relax her strict regulations in regard to passports, and allow the forwarding of through travelers and through baggage without delays of custom house and sanitary inspectors. The time by this new express from London to Lisbon will be about 48 hours, and will bring Paris within a day's ride of Madrid.

Of the Russian railways and railway projects in Asia it is hardly necessary to speak, since they lie within her own territories, and only remotely affect international relations. They have, however, already been so successful in tranquilizing the native populations that they are worthy of mention as illustrating the peace-making effects of transportation between different nationalities. The line across Siberia, if ever completed, will threaten the kingdom of Corea and perhaps China also.

On China's southern boundary the projected French roads in Tonquin will also give a military advantage to one of China's enemies. A French commission has advised the construction of three lines centring at Honoi, and also connecting it with the sea. It is recommended that the subway be built by the French protectorate but the superstructure and the operation of the lines be intrusted to a private company.

It is not strange, therefore, if China, with railways threatening its borders, has begun to entertain propositions for railroads and telegraphs within its empire. Aside from rumors, it was definitely stated at a recent meeting in London of the Australasian & China Telegraph Company, that negotiations were in progress with the Chinese government for an extension of the company's submarine lines. The Chinese officials had preferred land lines of telegraph, but an agreement between the Australian Company and the Chinese government is under consideration at Pekin. As the United States may be said to be nearer to China than any of the European peoples by the entire width of the Atlantic Ocean, it is to be hoped that we shall have a share in the construction of both her railroads and telegraphs, whenever she shall decide to build them.

General Prejevalsky, who appears to have carefully studied the Asiatic peoples, says of the introduction of railroads into China: "The introduction into China of machinery would deprive many millions of people of the manual labor by which they earn their daily bread, railroads would rob millions of drivers and porters of their food; the result would be the creation of a proletariat, a social element that would prove more dangerous than in Western Europe, as in China land is occupied to overflowing." * * China is confronted with a dilemma from which there is no escape; either she must plunge headlong into the vortex of absolute and complete reform and change all branches of her institutions, social and political, or she must remain under the dominion of all her old traditions, paying as best she may the presence of Europe."

We may add the remarks of the English Consul at Canton, in his last report to his government: "Knowing so little as we do of China, an investment of Chinese railway stock must be in nearly every instance a wild speculation, from which only the manipulators of the shares could hope to get a return."

Comparative Railroading.

In an able and unfavorable review of Mr. Dorsey's "English and American Railroads Compared," the London *Economist* says: "There is every reason to believe that in England much train mileage is made in excess of the public's requirements, the companies competing in this way instead of reducing fares. The result is increased expense to the railroad, while the public obtain little or no benefit. The goods-train mileage might also be economized with advantage, but of

course changes need to be effected with great care. In fact, to accurately adjust train mileage in all its details to the requirements of the public, so that the maximum of advantage is obtained by both parties, requires very considerable skill, and in this respect the American railways fare better than we do, for they command in a very peculiar and exceptional way a very large proportion of the technical and organizing talent of the country."

Such an award to American railroads of superiority in public service and in management, may be accepted with modesty, but not without further question.

No doubt the American railroad system and its personnel are a product of the genius of the American people and their vast opportunities as owners of such a territory; but they would not have attained success without American freedom, industrial and social. The English car is in more than one sense a coach, and recognizes English caste prejudices in its construction, while the American car was designed to carry passengers by steam power, and has been changed and adapted to whatever was required of it; into a traveling "parlor," a hotel or a restaurant. The American locomotive, which, as the *Economist* admits, "is coming into partial use in England, and may ultimately prove more economical for some purposes than the engines now in use," and the American freight car show the same freedom to adapt the instrument to the work to be done—a free exercise of ingenuity untrammeled by any prejudice.

But the freedom to build and to operate without interference by a stern and parental government has done more for the development of American roads than many are ready to admit. We do not mean to imply that English roads have not been free, but to note the fullness of American liberty in individual and commercial enterprise. Had the general government interfered too early in our railroad affairs, American roads would hardly have reached their present development.

Legislation would hardly have admitted the principle of "charging what the traffic will bear," or as Mr. Seligman has rendered it, "what the traffic is worth," before its necessity had been demonstrated. Early railroad officers coming from positions in private business, and like men of experience, confident in their preconceived opinions upon new subjects, were unwilling to admit such a principle. The vested right of geographical position seemed to them unquestionable. Even under such an excellent law as that controlling the building of new lines in England, our railroad development might have been retarded.

The vast opportunity required free play for all the forces of enthusiastic enterprise, and loss is not to be estimated for this period of construction, by merely counting up the wasted capital of defunct companies, but by some estimate of how much less wealth would have been produced had our far western roads not been built.

It is important that the history and the lessons of the past should not be forgotten. They are well summed up in the remark of an able Frenchman as to the two most prominent tendencies exhibited at the International Railroad Congress at Milan, namely, that toward economy of management and operation, and that of reaction against excessive governmental interference.

The railroad manager must be free, not from control, but from any obstacle which shall prevent the development of traffic, and remove responsibility for cost of service. The great defect in American railroads has been the possession by many men of power, without an adequate and well defined responsibility. In a general sense, the responsibility to the public, the shipper and the passenger, has been greater than to the holders of stocks and bonds. Governmental influence is needed mainly to define and enforce responsibility for the pretty free exercise of power by able and large minded managers.

Government must demand unity of action by the roads, but only because this is an element of public welfare; but it remains to be not merely found but demonstrated that any force exists in modern society which can replace competition. It may, indeed, be that the work of competition may be at some points completed, and the instrument which it has created will thereafter need only careful supervision, but this doubt is all that need be conceded.

The railroad is a creature of competitive commerce. The extent and variety of traffic in this country is undoubtedly a very important factor in the superiority of American railroads, but freedom was born to it as the sun to the soil, bringing forth, no doubt, many weeds, but also all our wheat and corn.

Mr. Baker, the British Consul at Vera Cruz, in a late report says that the new reduction in freights to 3 cents per ton per mile on the northern (American) lines with the approaching completion of the Tampico branch of the Central and a reported project, by American capitalists, to build bonded warehouses at Brazos de Santiago for the export trade to Mexico, in face of the fact that the ton-mile rates between Vera Cruz and Mexico range from 9 to 15 cents, have developed considerable apprehension and pessimism among the merchants and journalists of Vera Cruz, and they demand all or either of the following measures: An energetic prosecution of the work on the breakwater; the substantial reduction of the rates to Mexico to the usual low American rates, or if that is impossible the immediate construction of a rival line via Jalapa and Puebla; the conversion of Vera Cruz into a free port.

The harbor works are being carried out with energy by Mr. A. Cerdan, a native of Vera Cruz. The Mexican Railway Company has since the commencement of this agitation reduced its through rates for car-load lots from an average of 15 cents per ton-mile to 10 and 9 cents—a concession

which does not satisfy the merchants of Vera Cruz, who think that 10 or even 9 cents per ton-mile for through freight in car-load lots "cannot be compared with the almost nominal rates the northern railways are satisfied with."

The Mexican Railway Company, on the other hand, call for a reduction of the landing charges at Vera Cruz, and are disposed to arrange with Liverpool shipowners for a cheap through rate from Liverpool to the City of Mexico, a proposition distasteful to the Vera Cruz merchants, who claim that as through goods would be carried cheaper than local goods, the arrangement would amount to a discrimination against them which would ruin their trade; or such unimportant remains of it as were not swallowed up by the competition of the American lines.

The proposition for a rival line, the success of which, according to Consul Baker, depends on the policy of the Mexican Railway Company, "is not so impossible an idea as the Mexican Railway Company would appear to think" as their line, 264 miles of main track and 29 of branches cost £8,068,400, or \$134,000 per mile; and a line from Vera Cruz, via Jalapa and Puebla, could be built to Mexico at from one-fourth to one-third of this sum, and the capital for this line, now that political troubles have become matter of past history, might, no doubt, be obtained with much less difficulty than formerly. The more cheaply constructed line, the Consul thinks, would be better able to bear the brunt of a freight war than the Mexican Railway.

The proposition to declare Vera Cruz a free port is not a new one, having been urged by the *Ferro-Carril* of Vera Cruz, and is now warmly adopted by all parties, who declare that the only loss the government would meet by the arrangement would be the import duties on goods consumed by the 22,000 inhabitants of the port, though no mention is made of the advantages which would accrue to the government.

Summing up, Consul Baker says: "Looking at the present crisis from the point of view of an impartial and disinterested observer, one cannot fail to see that the alarm of the merchants, journalists and public men of this state is not groundless, or very much exaggerated. The lowest freights for imported goods of the Mexican (English) Railway Co. are at least 50 per cent. too high, and unless the company proceeds without delay to make a general and sweeping reduction of its rates the great bulk of the trade of Vera Cruz will certainly be diverted to the north, and be divided between the Mexico-El Paso line and its Tampico branch, to the advantage of the United States and disadvantage of all other countries, especially England, France and Germany, * * * In short, the advantages which would accrue to British and European commerce by the declaration of Vera Cruz as a free port are too obvious to require detailed consideration."

Herapath's Journal considers this an extraordinary attack on an English company by a British consul, and asks, assuming that the Tampico line can carry freight at 3 cents per ton-mile against the Mexican Railway's 9, as the distance is three times as great, where is the advantage? As 3 cents is about three times the average freight rate in the United States, it seems possible that the English line may have to reduce its rate to that to keep even with the Tampico Branch, which involves some seven or eight times the reduction accomplished in this country during the last 15 or 20 years.

The Arrow Steamship Co. was to revolutionize steam navigation by means of the "Pocahontas," a vessel of peculiar proportions and construction, which was to be built at Alexandria, Va. The *New York Herald*, in relating the history of the enterprise, declares it another *Tortillitas*. Whatever the financial *bona fides* of the promoters, the design of the "Pocahontas" was so entirely unpractical that it seems doubtful whether she would ever have floated when launched.

While longer than any steamship running, she was several feet narrower than a well-known vessel which is only kept upright by means of ballast. It is, therefore, highly probable that no amount of ballast would have prevented the capsizing of the "Pocahontas." The weight of her hull would, however, have been so great, that it is doubtful whether she would not have touched bottom without any ballast. The hull of a very narrow ship weighs nearly as much as that of a vessel of similar length and depth but say 50 per cent. greater beam. The broader vessel has, however, about 50 per cent. greater displacement, which gives a far greater margin for the weight of engines, coal and cargo. The following figures for two vessels, each 550 ft. long and 25 ft. draft of water, will illustrate this:

	40-ft. beam.	60-ft. beam.
Weight of hull, tons	6,500	7,000
" engines, tons	2,500	2,500
" coal, tons	1,000	3,000
" cargo, tons	nil.	3,500

Total displacement, tons 10,000 15,000

The figures are, of course, approximate, but in showing that the narrow vessel could convey no cargo, and only one-third the quantity of coal carried by the broader vessel, they agree fairly well with the lessons of actual experience. In addition, however, to her unfortunate proportions, the "Pocahontas" was to be built with numerous water-tight bulkheads only about 7 ft. apart. They would have added considerably to her weight, as, practically, the walls of every cabin were to be built of solid iron instead of light woodwork.

It seems fortunate that she was never built, and unfortunate that such a design was ever conceived.

Grain storehouses or elevators for receiving grain from the farmers at the way stations of the roads in grain growing regions like Minnesota and Dakota are, of course, crowded

or less every year when the shipping is most active, because the storing capacity provided is naturally never much beyond the prospective needs at any one place. Crowding causes complaint, and there are always those who demand

that the roads provide the remedy, on the principle of the man who justified any claim against the railroads because "they got hold of all the money there was in the [his small] community." But the railroads not only have good reason to decline investment in storehouses such as are needed, they would quite likely be transcending their just powers if they were to embark in a business which has so much in it that does not belong to transportation. Much of the grain needs some cleaning while going through the loading process, and a longer or shorter sojourn under competent care is generally necessary at this stage to allow the grain to fully dry, so that there will be no danger of its heating. This service belongs to the owner, not the carrier; and the prevailing practice of leasing space on the railroad land for the erection of buildings by grain buyers who both know how to care for it and are willing to furnish the capital necessary to carry it as long as may be necessary, would seem to be the natural and reasonable method of meeting the case. The duty of furnishing a reasonable supply of cars to the various shippers impartially is, of course, the railroad's; and although this duty has undoubtedly been trifled with to some extent in the past, and some elevators have been favored at the expense of others, the influence of the Inter-state law doubtless has a strong tendency now to make railroads careful not to do any injustice to customers. The stock yard case at Covington, Ky., recently decided by the Inter-state Commission, has a direct application here, and should be noted by the grain district roads. As doubtless the evil of using cars as store-houses after they reach destination exists at the grain centres as well as everywhere else, those interested will do well to note what the Commission may say on the Pittsburgh & Lake Erie coal car case referred to in these columns last week. As the lack of cars all around is in consequence of their standing still so much, complaining shippers might perhaps make a point by summoning some of the car accountants as experts, to tell how cars can be made to move instead of standing still; though such action on the part of many complainants would be in danger of proving a boomerang.

One of the curious things about lawsuits is the certainty with which one can look for a decision or an opinion on almost any question under the sun. Not only do we find people who are ready to complain at all sorts of treatment, either just or unjust; there are plenty of them to not only complain but to take their grievances into court. Railroad history does not cover a period very far into past ages, but it would be hard to find any subject connected with railroad administration, even remotely, on which two people can disagree, that has not been the subject of judicial inquiry. The volumes of legal reports are crowded with these cases, and the summaries that appear in the *Railroad Gazette* will be found to cover, in a short time, a most extensive variety of topics. In the list printed this week will be found cases of interest, not only to managers, superintendents and lawyers, but to yard-masters, freight conductors, firemen, baggage-masters, paymasters, cashiers, foremen of coal chutes and various other classes. If one is at all disposed to learn by other people's experience there can be no lack of opportunity as long as the courts are open and people abound who are willing to risk their money in foolish or silly, as well as just suits. Any superintendent who wishes to enforce his orders by giving concrete examples of the occasion or object of issuing abstract rules has but to apply a magnifying process to tersely expressed court records and make the men read them.

The omission of the word *Valley* in our news columns last week made the Housatonic Railroad appear as making official changes, which really took place in the board of the *Housatonic Valley* road, the new company organized to connect the New Haven & Derby with the New York & New England.

Record of New Railroad Construction.

Information of the laying of track on new railroad lines in 1887, not before reported, is given as follows:

Chicago, Santa Fe & California, since last report, 120 miles.

Kansas City, Wyandotte & Northwestern, to Circleville, Kan., 30 miles since last reported.

THE SCRAP HEAP.

The Grade Crossing Question in Buffalo.

A Buffalo dispatch of Nov. 16 says: The Board of Railroad Commissioners has rendered a decision in the grade crossing matter, recommending that certain of the streets in (Buffalo) be depressed and the tracks crossing them elevated, in the nature of a compromise. In other cases the Board confesses itself unable to make any recommendations, believing that the matter will right itself in time. The report is signed by Commissioners Rogers and Baker. Commissioner Kerman concurs in the report, and says the elevation of the tracks is the best remedy proposed for the existing difficulties, and, as recommended by the Board, it will inaugurate a system which, as extended, will free the streets without injuring adjacent property. The plan of bridging streets, as proposed by the railroads, is viewed with disfavor.

Train Robbers Convicted.

James and Benjamin Hughes, who were arrested for train robbery in Texas in February last, were convicted last week. Wm. Carter, who was arrested at the same time for complicity in the robbery, was acquitted.

Pennsylvania Railroad Savings Fund.

A special meeting of the directors of the Pennsylvania Railroad Co. was held in Philadelphia this week, at which it was agreed to put into effect among the employees of that corporation a trust savings fund. Amounts from \$5 and upward may be deposited under the plan and draw interest at the rate of 4 per cent. per annum. The principal object of the saving fund is to benefit those employees who are remunerably situated from saving and other depository institutions, but all classes of employees will be admitted to the

benefit of the plan. All station agents of the company will be authorized to receive deposits and receipt for the same. They will be forwarded to some authorized depository of the company.

The British will be Welcome.

The British Iron and Steel Institution has issued a circular to its members requesting them to give their views as to holding the autumn meeting of 1888 in this country. It is estimated that the trip will entail an absence of about six weeks from England, at a cost of from \$300 to \$500, according to the member's style of arrangements.

A visit of the kind contemplated would be pleasant and advantageous to all parties, and would remove a great deal of the prejudice many of the members have to this country.

Our Style has Its Good Points.

"If American companies were compelled to keep their accounts in the mode prescribed by the Board of Trade, here, it would do something to enlighten the ordinary investors, if not serve as a brake on actual extravagance."—*Herapath's Journal*.

If the Board of Trade prescribed the return of the ton and passenger mileage on English roads, items voluntarily given here, it would do something to enlighten British freighters, if not entirely break up the exorbitant freight charges, which possibly have a greater influence in the present industrial depression of that country than any other.

As Others See Us.

Don M. Dickinson, of Michigan, does not look unlike Daniel Dougherty did in his younger days; he is about Dougherty's figure, but lacks his dignity. He is not impressive in appearance. He looks like a successful railroad manager—not the President of the road, but the General Superintendent. He's a worker—what they call out West a "honey cooler" or a "rustler." Dickinson is about 45 years old.—*Philadelphia Record*.

Out of Steam.

The *Railroader*, a monthly journal published in Washington and New York, ceased to exist with its last issue, aged 11 years.

Refuse to Run on Double Headers.

Since the Chatsworth disaster engineers and brakemen of the Iowa and Dakota division of the Chicago, Milwaukee & St. Paul have been wary of running double headers. On Nov. 15 a brakeman, named Boone, was summarily discharged because he refused to run on a double-header. The same day nearly all the brakemen on the division signed a demand for his reinstatement and the abolition of the double-header system, under threat of leaving the employ of the road.

TECHNICAL.

Index to the Journal of the Franklin Institute. In July it was announced that the Committee on Publication of the Franklin Institute has in contemplation the publication of an index of authors and subject matter, embracing the first 110 volumes of the *Journal of the Franklin Institute*, from 1826 to 1880. This index will be published if a sufficient number of subscriptions can be obtained to cover the cost. The subscription price has been placed provisionally at \$5, and subscribers are requested to address H. L. Heyl, Actuary, Hall of the Franklin Institute, Philadelphia, Pa. This is a work which cannot fail to be of great importance to scientific readers in many fields, and it will be a pity if the publication fails for want of proper support. Under date of Oct. 30, Mr. Heyl published a circular, saying that, although a large number of subscriptions have been received, the number is thus far insufficient to cover the necessary outlay, and he again calls attention to the matter.

New Car Heater.

A car heater has lately been patented by Mr. H. C. Dennis, of Tyrone, Pa. An ordinary car-stove is enclosed in a safe with a door that closes in case of accident, the door of the safe being connected to the truck. Any serious accident would probably sever this connection, when the door of the safe would be closed by means of a spring. Means of ventilating the car are also provided. A current of pure air is continuously admitted from the under side of the car, circulating through the casing, where the air is warmed and whence it passes into the car.

Car Heating.

The Pennsylvania will have a train of passenger cars equipped with steam-heating apparatus ready for travel in a few weeks. The Lehigh Valley is also preparing to heat its cars with steam. The Rome, Watertown & Ogdensburg began this week heating its cars on the Syracuse branch by steam from the locomotive.

The Julien Electric Lights.

The Canada Atlantic has equipped one of its express trains running between Montreal and Ottawa with incandescent electric lights, which are fed by storage batteries of the Julien system, and is soon to have another. The Intercolonial has also given an order for this system to be applied to two entire trains, 18 cars.

Electric Lighting on the Connecticut River Railroad.

The Barrett Electric Lighting & Car Heating Co. are lighting railway cars by electricity with incandescent lamps by means of steam taken from the locomotive and by storage batteries. The system is now for the first time used on an entire train on the Connecticut River Railroad with marked success. The plant consists of engine and dynamo built for this purpose. The engine is seven horse power, and runs 60 lamps with ease. The dynamo is 70-light incandescent. The engine and dynamo take floor space of 30 sq. in. There are 10 lights to each passenger car, and storage batteries of 24 cells, which light the entire train for two hours in case of accident to the locomotive or should it be disconnected from the train. The cars are lighted from the storage batteries only when the dynamo is not running. The dynamo charges the storage battery with the surplus electricity that is not consumed in lighting. The steam is taken from the locomotive, through Barrett's patent coupling, at full boiler pressure, without any escape, into the engine in the baggage car, which runs the dynamo 1,500 revolutions. The engine and dynamo being intact, the moment the steam is shut off from the locomotive the lights are cut out from the dynamo automatically. The exhaust from the engine in the baggage-car is turned into the steam pipes and heats the entire train. The system works so perfectly that little attention is required. Any express messenger can run it without any assistance after a few days' experience. The cost is said to be less than that of any other method, and safety is assured.

The Connecticut River Railroad Co. was, we believe, the pioneer in continuous steam car-heating, and it is now among the first to use electric lights in its cars.

Wind Pressure on Large Bridges.

Some careful observations have been made at the site of the Forth Bridge as to the pressure of wind on large structures at a considerable height. Gauges of different sizes, some exposing considerable area, have been erected at 150 ft. above high water mark, and the results have been carefully

noted during the last four years. The highest wind pressure registered by the large gauge was $35\frac{1}{4}$ lbs. per square foot, whereas in the calculations a pressure of 56 lbs. per foot was allowed for. The site of the bridge is exposed to violent gales, and this amount probably represents the maximum force of the wind when acting on a large area in severe storms. The force, however, of a tornado is doubtless greater.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulations of Railroads.

In Iowa the Supreme Court decides that an ordinance which grants a street railroad company the right to lay and operate tracks in a city, and provides that the "right herein granted to said company to operate said railway shall be exclusive for thirty years, and that no privilege shall be granted to other persons which may impair the privilege herein granted," operates as an exclusive grant of street railway privileges to such corporation, and not merely to secure the corporation the sole use of the tracks it should lay. The Court also holds that the constitution of the state of Iowa, §12, art. 8, providing that "no exclusive privileges, except as in this article provided, shall ever be granted," has no application to the case of an exclusive grant to a corporation, where the grant is of such rights as might properly be acquired by an individual by contract.¹

The Supreme Court of Missouri decides that when the charter of a railroad corporation provides, in substance, that the company shall have full power and authority to build their road along or across any state or county road, or the streets and wharves of any city, town, or village, whether corporate or otherwise, an order for the same being first had from the county court of the proper county, the granting of such order is an exercise of the administrative discretion of the court, from which an appeal does not lie to the circuit court.²

In Iowa the Supreme Court decides that when a law authorizing the collection of taxes to aid in the construction of a certain railroad has been repealed after such tax has been voted, and said railroad has been transferred by a perpetual lease, by which the larger part of the amount expended up to the time of the transfer in the partial construction of the road is repaid, and said lease shows no intention to transfer the taxes, and imposes no obligation on the lessor to spend any more money, and neither lessor nor lessee has made any expenditures relying on the taxes, by appropriating for specific purposes any money to be obtained therefrom, the taxes are void, and their collection may be enjoined.³

In Virginia a railroad in whose aid a county had voted bonds, payable upon construction of the road through the county by 1892, took the bonds and executed a first mortgage to secure the county against accruing interest, and to indemnify it against all liability on the bonds in the event of the road not being constructed by that time. The company then hypothecated some of the bonds. A second and a third mortgage of the road were then made, one by the original company, and the other by its successor. These last mortgages were subsequently foreclosed on a general creditors bill, and a sale had subject to the lien of the first mortgage, the interest on which was not in default. The proceeds were applied, in part, to the redemption of the hypothecated bonds. The Supreme Court of Appeals decides that the purchaser at the sale was not entitled to the redeemed bonds, except upon paying into the general fund for creditors realized by the sale the amount taken therefrom to pay the debts for which the bonds had been pledged.⁴

In Kentucky it is held by the Court of Appeals that where one railroad sells out to another, a person having a claim against the former company for damages on account of personal injuries cannot maintain an action against the latter company; and the old company, against which his right of action existed, having been dissolved by the sale, his only right of action remaining is against the stockholders of the old company, who received the purchase money.⁵

In Georgia the Supreme Court rules that the establishment of freight rates by the railroad commissioners is a "rule or regulation" within the meaning of Code Ga., § 719, giving an action for any injury done by a railroad "in violation of any rule or regulation" of the commissioners, and an action brought to recover an excess of freight paid must be brought within the 12 months limited by the statute.⁶

In Illinois the Supreme Court decides that where a railroad charter gives no express authority to cross any street in the city of Chicago, but gives authority to construct a railroad from Vincennes, Ind., to and into the city of Chicago, with a general power to cross any road or highway on the route, the charter is to be held as one giving such power outside of the corporate limits of the city, and by no reasonable or fair intendment can it be held that the grant of authority to run the road to and into the city of Chicago operated as a grant of the use of the streets, or either of them, to the company for the purpose of laying a track upon them.⁷

In Illinois one who had been paymaster of a railroad for 15 years executed a bond with sureties, in the usual form in the penal sum of \$40,000, with condition as follows: "That if the said Charles S. Bartlett shall well, truly and faithfully perform the duties required of him by said company as paymaster, and promptly pay over and promptly account for all moneys belonging to said company which shall be received by him as such agent, and shall deliver over to said company all property of said company when required, then this bond to be void; otherwise to be in full force and effect." The company provided a safe, and placed it in the treasury department for Bartlett's use, and directed him to leave the combination of the lock with the cashier, who had charge of the room in which the safe was kept. This safe was practically open at all times to the cashier by the company's direction, and the latter was in the room and most likely by himself while Bartlett was out at lunch, when some one unknown opened the company's safe and abstracted therefrom \$26,833.54. Bartlett at once reported the facts to the company, and has not otherwise accounted to it for the loss. Near the safe was a door which led into an adjoining vacant room, the doors of which were unfastened and opened into an outer court, near a back stairway which led to the basement below, from which there was access to the streets. Before moving into the building Bartlett called the attention of the treasurer, who was the head of this department, and to whose orders all belonging to it were subject, to the danger from this door, and suggested that it should be "bricked up," to which the treasurer replied that it would be sufficiently secured with a Yale lock. Mr. Smith, the cashier, had charge of the room and the key to the lock. When the robbery was discovered, this door was found standing ajar. In an action upon the bond the Supreme Court approves the finding of the jury that there was such negligence on the part of the company, in respect to the door of the office opening into the adjoining room, and in leaving the doors of the latter room unfastened, as to defeat any right of action on the bond.⁸

Carriage of Goods and Injuries to Property.

In Iowa an opening had been left in a railroad embankment, and the track laid on trestle-work at the request of the owner of the land through which the road ran, and for the

purpose of enabling his cattle to pass from one side to the other. This opening was not intended as an outlet for water, and was not adapted for such purpose. In an action by a neighboring land owner against the railroad company for damages occasioned by the obstruction to the flow of surface water created by the embankment, the Supreme Court holds that the cause of action arose from the erection of the embankment, and not from the failure of the company to make and keep the opening sufficient as an outlet.⁹

In Georgia the Supreme Court holds that if a street in a city be occupied by the side tracks of a railroad, and its cars and engines, without authority of law, it is a public nuisance. If the owner of adjoining property suffer special damage therefrom, in which the public do not participate, this entitles him to maintain an action. And if the injury, from its nature, is not susceptible of being adequately compensated by damages at law, or is such that, from its continuance, a permanent mischief must occasion a constantly recurring grievance, which cannot be otherwise prevented, equity will enjoin it.¹⁰

In Texas, in an action for negligence in allowing sparks to escape from a locomotive, so as to set fire to and destroy plaintiff's pasture grass, the evidence showed that the railroad's right of way was covered with combustible grasses and weeds, that these were ignited by sparks emitted from a passing train, and the fire spread to and destroyed plaintiff's pasture. The Supreme Court decides that this was sufficient to establish negligence against the railroad, and was not overcome by evidence that the company's engines were provided with spark-arresters, without showing the condition of the particular engine which caused the fire.¹¹

In Iowa the Supreme Court decides that the annoyance caused to one residing on property 98 ft. distant from the right of way of a railroad, but not abutting thereon, by a coal chute within the right of way, is not the subject of damages where the chute has been properly built, and is operated in the usual and customary manner.¹²

In Iowa, in an action for killing plaintiff's horses on a highway crossing where there was an insufficient cattle guard, it appeared that plaintiff, after plowing with the horses all day, brought them home about 7 o'clock in the evening, and turned them loose in an enclosed lot adjoining a highway. There was an aperture for a gate on the side next to the highway, which was left open except for a single loose bar about four feet from the ground. The horses pushed this bar aside while plaintiff was at supper, escaped into the highway and upon the crossing, where they were killed by defendant's train. The Supreme Court holds that it was for the jury to say whether turning the horses into this lot, under the circumstances, was contributory negligence, or equivalent to allowing them to remain at large within the meaning of the Iowa herd law, prohibiting stock from running at large during certain hours of the day.¹³

In Texas, in an action against a railroad company to recover the value of wood appropriated by defendant, it appeared that the wood had been cut by one T., and piled up on plaintiff's land; that plaintiff claimed compensation from T. for other wood which T. had cut off of his (plaintiff's) land; that T. told plaintiff that he would turn over to him the wood then stacked on plaintiff's land, in settlement of the claim, but that if (T.) should come with the money and settle the claim, plaintiff must let him have the wood. To this plaintiff assented. T. absconded without settling. The Supreme Court decides that title to the wood passed to plaintiff, and he might recover its value of the railroad company.¹⁴

In Indiana the Supreme Court holds that where a railroad company, with the leave and license of the owner, had entered upon and taken possession of a strip of land, and upon the faith of such license had expended large sums of money in the construction and maintenance of its line of railroad thereon, the owner or his assigns are estopped from revoking such license, and that the right of way thus acquired, in the absence of any limitation thereon appearing, extended to the full statutory width of 6 rods.¹⁵

A business firm residing in Boston, Mass., delivered there a box of books consigned to themselves at Louisville, Ky., to the defendant, who was a common carrier and acting somewhat as an express company, but made its bills of lading to the depot at Louisville only. After transporting the box to its destination the defendant held it at the depot for some two weeks, until a person who would have been entitled to receive from the consignors the bill of lading upon the payment of charges, sent, without such payment, an order to the appellees for the box, signing himself as agent, although he was not the agent of the consignors, and the box was delivered on such order. In an action against defendant upon the bill of lading for the value of the goods, the Supreme Court of Indiana holds that although the extraordinary liability of the defendant as an insurer ceased upon the arrival of the box at the depot, it became responsible from that time forward, under its contract of carriage, as a warehouseman, and was liable for the want of proper care in the delivery of the box.¹⁶

Injuries to Passengers, Employees and Strangers.

In Mississippi a passenger testified that he delivered his baggage to the baggage master of defendant, with instructions to ship to a specified place the next day, unless directed to the contrary, and that no contrary direction was given. The defendant did not ship as ordered and the baggage was destroyed by fire. The defendant's evidence was that, by a regulation of the company known to plaintiff, no baggage could be received except for immediate shipment, and that the baggage-master took charge of plaintiff's baggage as a mere accommodation, without any instructions as to shipment. The Supreme Court holds that the defendant is liable—if liable at all—as a carrier for the value of the baggage.¹⁷

In Iowa a brakeman sued for an injury received while coupling a car which was defective. The Supreme Court holds that the fact that he was injured while disobeying a rule of the company that a stick must be used in coupling cars does not prevent him from recovering in such action, when it appears that the injury actually suffered would have been received even if the stick had been used in making the coupling. In such action, when it appears that the switchman under whose direction trains, including that in which was the car in question, were made up, discovered the defect in said car, communicated that fact to the general office by a telephone which had been placed in the yards for such purpose, and received the reply, "If she will hold together, send her off," it is to be presumed that such direction came from one having authority to give it, in the absence of evidence to the contrary.¹⁸

In Michigan a switchman, whose duty it was to couple cars and make up trains for the defendant railroad in its yards, was assisted in that work by a helper, and an engineer and a fireman upon the switching engine. An action was brought by the switchman to recover for injuries received by him, while upon duty, through the alleged incompetency of the fireman in being unable to properly communicate to the engineer the signals prescribed by the well-settled code of the company, and used in making up trains. The Supreme Court holds that the plaintiff, in order to recover, must establish affirmatively the receipt of the proper signal by the fireman, and his misinterpretation of the same to the engineer, through ignorance of the meaning of the signals, and that by reason of such mistake the injuries were received.¹⁹ In the same state the deceased, an employee of a car-building company,

crawled under some new cars which had left the company's yards as completed, and which stood upon the defendant railroad's track ready for transportation. This he did after the conductor had looked over the cars to see if any one was under them at work. The train was then coupled to the new cars and started up and deceased was killed. The Supreme Court rules that deceased was guilty of contributory negligence, and that it was error to submit to the jury, in the absence of evidence, the question whether or not there was a custom for the employés of the car-building company to go under the cars for repairing them, after they had been turned over to the railroad company as completed.²⁰

In Missouri a person was injured by a train of freight cars while they were backing into a coal yard, without having a man stationed on top of the car at the end of the train furthest from the engine, to give danger signals, as required by an ordinance of the city of St. Louis. In an action for damages the Supreme Court holds that notwithstanding the plaintiff may have been guilty of contributory negligence, the railroad company was still liable for the injury if it could have been prevented by the exercise of reasonable care on the part of the company, after discovery of the danger in which the plaintiff stood, or if the company failed to discover the danger through its own recklessness, when the exercise of ordinary care would have discovered it, and averted the calamity.²¹

A Tennessee statute requires that "when any person, animal, etc., appears upon the road, the alarm whistle shall be sounded, the brakes put down," etc. The Supreme Court holds that the requirement is not applicable to a collision which was caused by the tongue of the wagon in which the plaintiff's intestate was riding catching in the locomotive and drawing the wagon alongside, and thus causing the death, neither the wagon nor the mules that were pulling it having got upon the track before the accident occurred.

Another section provides that when a train is approaching a crossing of a public road distinguished by a sign, "Look out for the cars when you hear the whistle or bell," it shall give signals in a certain manner. The Court holds that the section has no application to a turnpike crossing at which no such sign had been put up.²²

In Louisiana a woman walking on a track carrying a child was struck by a locomotive and killed. The Supreme Court holds that the railroad is not liable.²³

In Ohio the servants of a railroad placed some signal torpedoes on the track near a depot and at a place used as a crossing. They intended to explode them, but went away without doing so. Immediately after the train had moved on, a small boy, about nine years old, who, with the knowledge of the railroad employés, was coming on the track immediately behind the train, discovered the torpedo, picked it up, and exhibited it to the plaintiff, a boy ten years old, and several other boys of about the same age, all of whom were ignorant of its dangerous or explosive character. While it was being so exhibited near where found, it exploded, without plaintiff's fault, with such force that it killed one boy, destroyed an eye of each of two other, and tore off plaintiff's left hand and arm, and otherwise injured him. The Supreme Court holds the railroad liable for the injury.²⁴

¹ Des Moines St. R. Co. v. Des Moines R. Co., 33 N. W. Rep. 610.

² St. L. I. M. & S. Ry. v. St. Louis, 4 S. W. Rep. 664.

³ Bartlett v. Meader, 33 N. W. Rep. 446.

⁴ Washington O. & W. R. R. v. Lewis, 2 S. E. Rep. 746.

⁵ Chesapeake O. & S. W. Ry. v. Priest, 4 S. W. Rep. 33.

⁶ Parmalee v. Savannah, F. & W. Ry., 2 S. E. Rep. 686.

⁷ C. B. & R. Ry. v. Chicago, 9 West. Rep. 493.

⁸ C. B. & R. Ry. v. Bartlett, 9 West. Rep. 469.

⁹ Haisch v. Keokuk & D. M. R. R., 33 N. W. Rep. 126.

¹⁰ Kavanaugh v. Mobile & G. R. R., 2 S. E. Rep. 636.

¹¹ Gulf, C. & S. F. R. R. v. Witte, 4 S. W. Rep. 490.

¹² Dunsmore v. Cent. Iowa R. R., 33 N. W. Rep. 456.

¹³ Timins v. Chicago, R. I. & P. Ry., 33 N. W. Rep. 319.

¹⁴ Tex. & Pac. R. Co. v. Beard, 4 S. W. Rep. 483.

¹⁵ Campbell v. Ind. & Vincennes R. R., 9 West. Rep. 371.

¹⁶ Merchants De-patch v. Merriam, 9 West. Rep. 392.

¹⁷ Ill. Cent. R. R. v. Troutine, 2 South. Rep. 255.

¹⁸ Reed v. Burlington, C. B. & N. R. R., 33 N. W. Rep. 451.

¹⁹ Catlin v. Mich. Cent. R. R., 33 N. W. Rep. 515.

²⁰ Coops v. L. S. & M. S. Ry., 33 N. W. Rep. 541.

²¹ Dunkman v. Wabash, St. L. & P., 4 S. W. Rep. 671.

²² Nashville, C. & St. L. R. R. v. Seaborn, 4 S. W. Rep. 661.

²³ Houston v. Vicksburg, S. & P. Scuth. Rep., 563.

²⁴ Harriman v. Pittsburgh, C. & St. L. Ry., 9 West. Rep. 438.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings of the stockholders of railroad companies will be held as follows:

Western, New York & Pennsylvania, at the office, Nov. 22.

Boston & Albany, annual meeting, Boston, Dec. 14.

Fort Worth & Denver City, annual meeting, at the office, Fort Worth, Tex., Dec. 13.

Mobile & Ohio, annual meeting, at the office, New York, Nov. 21.

Old Colony, annual meeting, United States Hotel, Boston, Nov. 22.

Buffalo, Rochester & Pittsburgh, annual meeting, New York, Nov. 21.

Georgia Pacific, annual meeting, at the office, Birmingham, Ala., Nov. 30.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Western Society of Engineers* holds its regular meetings at its hall, No. 15 Washington street, Chicago, at 7:30 p. m., on the first Tuesday of each month.

The *New England Railway Club* meets at its rooms in the Boston & Albany passenger station, Boston, on the second Wednesday of each month.

The *Boston Society of Civil Engineers* holds its regular monthly meetings at its rooms in the Boston & Albany station, Boston, at 7:30 p. m. on the third Wednesday of each month.

The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, on the third Thursday of each month.

The *Western Railway Club* meets in Chicago the third Wednesday in each month.

The *American Society of Mechanical Engineers*, eighth annual meeting, Philadelphia, Pa., Nov. 28 to Dec. 2, at the Continental Hotel.

The *American Society of Civil Engineers* meets at its rooms, 127 East Twenty-third street, New York, the first and third Wednesdays of each month.

The *Engineers' Club of St. Louis* meets the first and third Wednesdays of each month till June.

The *Central Railway Club* meets at the Tift House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The Master Car-Builders' Type of Coupler.

The following circular has been issued by the sub-committee on the Master Car-Builders' Type of Automatic Couplers.

The committee consists of Messrs. EDWARD B. WALL

(Pittsburgh, Cincinnati & St. Louis), R. D. WADE (Richmond & Danville), JOHN S. LENTZ (Lehigh Valley), and JOHN W. CLOUD (New York, Lake Erie & Western).

"**NEW YORK, Nov. 15, 1887.**

"The report of the Executive Committee of the Master Car-Builders' Association having been approved by the Association, and the Janney Type of Coupler having been made the Master Car-Builders' Standard, sub-committee has been appointed by the Executive Committee to consummate the recommendation of the report that the Association procure one of the present makes of Janney Type of Coupler, selection being made by a committee appointed for that purpose and then all other forms of couplers that will couple to and with this coupler, under all conditions of service, are to be considered as within the Janney Type and conforming to the standard of this Association."

"All parties who claim to manufacture couplers within the Master Car-Builders' type are requested to send two couplers completely finished and ready for service, to R. D. Wade, Superintendent of Motive Power, Richmond & Danville Railroad, 1300 Pennsylvania avenue, Washington, D. C., on or before Dec. 13, 1887. Such parties are further requested to send a representative to appear before the Committee on the above date and at the above place, who will with proper drawings describe the mechanical construction of the coupler he represents, such drawings to remain with the Committee and become the permanent property of the Master Car-Builders' Association.

"If in the judgment of the Committee it should become necessary to attach the couplers to cars, the Committee will provide cars and facilities for testing, but all expenses incident to attaching the couplers must be defrayed by the owners of the couplers.

"The Committee will not consider models or drawings of couplers not represented by full-sized couplers ready for attachment to cars as above described.

"The Committee will make their report to the Executive Committee, who will issue drawings of the Master Car-Builders' Type, and officially announce the names of the couplers which are within this type.

"The members of the Master Car-Builders' Association are invited to meet with the Committee and assist them in their investigation of the various couplers."

Western Society of Engineers.

At a regular meeting on Nov. 1, John F. Barney and Jacob Rodatz were elected members of the Society.

The resignation of Mr. Moorehouse as Secretary, which was tendered at a preceding meeting, was discussed, and a committee was appointed to take steps toward due recognition of the services of Mr. Moorehouse to the Society.

Mr. Gay sent a communication calling the attention of members to a display of work by the engineering students of Ann Arbor.

Mr. Scherzer presented a discussion of Mr. Lundie's paper on the Economical Height of Bridge Trusses. The paper was discussed also by Messrs. Artingstall and Strobel. At the next meeting paper on Field Work will be read by Mr. Fiend.

Engineers' Club of St. Louis.

At the regular meeting, Nov. 2, at Washington University, the Executive Committee submitted a programme for the meetings of the coming year, to include June 6. Meetings are arranged for the first and third Wednesday of each month, and the committee has assigned topics for papers by various members for each meeting.

A communication from the Board of Managers of the Association of Engineering Societies, on the subject of a closer union between the various societies was made a special order for the meeting of Nov. 16.

Mr. C. E. Jones read a paper on Steam Heating at Washington University and Experience with Underground Pipes. It was stated that the boilers were regularly doing double the duty which was originally expected of them, but the evaporative efficiency did not seem to be reduced. The smoke-consuming device had failed on account of the excessive duty required of the boilers. The underground pipes had failed after years of service from external corrosion, due to the accidental admission of moisture to the conduits.

Engineers' Club of Kansas City.

A regular meeting was held, Nov. 7, at the club rooms, 19 Dearborn Building. Wynkoop Kiersted was elected a member. Messrs. Wise, Breithaupt and Chanute were appointed a committee to act in conjunction with the Executive Board of the Council of Engineering Societies. Mr. Kiersted read a paper on Water Supply and its Development for Small Cities in the West.

American Society of Civil Engineers.

At the regular meeting of the American Society of Civil Engineers on Wednesday evening, an interesting paper on "Experiments upon Z-Iron Columns," by C. L. Strobel, member of the Society, was read. A short paper, describing a test of wrought-iron double-track floor beams, by A. P. Roller, member of the society, was also presented. Mr. S. S. Wheeler, Junior American Society C. E., exhibited and explained an ingenious chart of wire gauges, the design of the chart being to simplify the confusion existing among the uses of gauges, caused in great measure by the great number of gauges in existence, having in reality but little dissimilarity. Mr. Wheeler spoke strongly in favor of the "American" or Brown & Sharpe gauge, as the best in use. Mr. Wm. Metcalf, member of the Society, in discussing the subject of gauges, recommended that gauges should not be used at all. Mr. Metcalf said that at their works they could and did use the micrometer entirely in place of wire gauges; that the only difficulty found was that when first using the micrometer a person would get the idea into his head that the mark on the circle which stands for thousandths of an inch really was thousandths of an inch. Mr. Wheeler thought that the use of the micrometer was not practical among rough workmen and people who had no experience in its use, to which Mr. Metcalf replied that they had had no difficulty whatever; that every man and boy in the works had his micrometer and knew how to use it, and used it in preference to any wire gauges, and all the men remembered the diameters of the different gauges and reduced them to thousandths without difficulty.

PERSONAL.

—D. B. Cummins, who has been a director of the Pennsylvania Railroad Company since 1878, has resigned.

—George F. Gardner has resigned the position of Trainmaster of the Cincinnati & Muskingum Valley road.

—Theodore Wygant, who has been Secretary and Assistant Treasurer of the Oregon Railway & Navigation Co. ever since its organization, has resigned his position.

—Benjamin Wells has just completed 50 years service as ticket agent of the Philadelphia, Wilmington & Baltimore road at Elkton, Md. Mr. Wells is now 78 years old.

—Henry C. Newman, who entered the employ of the New York Central & Hudson River in 1853, died last week at his house in Syracuse, N. Y., after an illness of 5 years' duration.

—A. F. Lincoln, the Paymaster of the Cleveland, Columbus, Cincinnati & Indianapolis, who resigned his position

several months ago on account of ill health, died at Denver, Col., last week.

—Brandon Mosely, General Manager of the Pacific Mail Steamship Co., in San Francisco, and formerly Manager of the Panama Railroad, died in San Francisco on Nov. 14, of cancer of the tongue.

—Cornelius V. De Forest, a nephew of Commodore Vanderbilt, and for many years purchasing agent of the New York Central, died in New York City Nov. 9. Mr. De Forest was about 70 years old, and had retired from the service some years ago on account of ill health.

—John C. Mitchell, Agent of the Construction Department of the Mexican National, died in Galveston, Tex., on Nov. 12. Mr. Mitchell had for some time been connected with the San Antonio & Aransas Pass and Mexican National roads at San Antonio and Corpus Christi, Tex.

—John D. Kernan has resigned as a Railroad Commissioner of New York. His associates adopted resolutions attesting that his service of nearly 5 years had been a great benefit to the community and honor to himself, and extended their best wishes for future success in the practice of law, which he is about to resume.

—Joseph Curtis Platt, one of the oldest and best known citizens of Scranton, Pa., died on Nov. 15. He removed from New Haven to what is now Scranton in 1846, and was one of the firm of Scranton & Platt, whose success in the iron business gave the start to the present city. The firm afterward became the Lackawanna Iron & Steel Co., in which Mr. Platt was a director at the time of his death.

ELECTIONS AND APPOINTMENTS.

Atlantic & Pacific.—C. H. Speers has been appointed Passenger Agent for the Pacific coast, with headquarters at San Francisco.

Baltimore, Grafton & Charleston.—John Bradshaw is President of this company, W. H. Ijams Secretary and Treasurer, and among the directors are Aubrey Pearce, Frank J. Harmisson and W. M. Clements, of the Baltimore & Ohio.

Buffalo, Rochester & Pittsburgh.—Alonzo Dolbeer has been appointed Superintendent of Motive Power in place of C. W. Mills, resigned. George C. Payne has been appointed Master Car-Builder.

Canada, La Crosse & Southwestern.—The following directors were elected last week: F. A. Roziene, A. R. Spriggs, B. W. Stevens, Charles City, Ia.; J. S. Kelso, Ackley, Ia.; W. H. Upham, Marshfield, Wis.; C. J. Ainsworth, Black River Falls; G. R. Montague, J. S. Medary, James McCord, Charles Michel, S. S. Burton, Joseph Clarke, E. N. Borrenson, La Crosse. The directors have elected the following officers: President, F. A. Roziene; Vice-President, Joseph Clarke; Secretary, A. R. Spriggs; Treasurer, S. S. Burton; Executive Committee, J. S. Medary, G. R. Montague and B. W. Stevens.

Central Indiana.—The directors of this new Indiana company are Lewis J. Highland, W. C. Wilson, of Lafayette, and W. J. Craig, John W. Kern and D. W. Whitcomb, of Indianapolis.

Chicago & Northwestern.—G. F. Bidwell has been appointed Superintendent of the Madison Division, vice W. A. Scott, resigned. H. M. Hughes has been appointed Superintendent of the Northern Iowa Division, vice G. F. Bidwell, transferred, and G. E. Boynton has been appointed Assistant Superintendent of the Northern Iowa Division.

J. O. Clifford has been appointed Freight Auditor, vice Wm. S. Hartwell, resigned. Edward C. Carter has been appointed Principal Assistant Engineer, with headquarters at Chicago; Wm. D. Hodge Assistant Engineer of the Iowa and Northern Iowa divisions, headquarters at Boone, Ia.

Chicago & West Side.—The incorporators are Williston Fish, Frank G. Holton, John M. Brown, Dennis W. Sullivan and Marshall Laham, all of Chicago.

Duluth, Red Wing & Southwestern.—The following directors have just been elected: S. B. Foote, S. W. Hoyt, Gov. Hubbard, T. B. Sheldon, Dr. G. H. Cray, Red Wing; W. F. Phelps, H. S. Baldwin, R. S. Munger, M. Spaulding, Duluth; O. S. Powell, River Falls; W. C. Ross, Zumbrota; A. T. Stebbins, Rochester; T. W. Thorne, Owatonna; James H. Parke, Albert Lea; Dr. W. H. Toyford, Geneva, Minn.

East Tennessee, Virginia & Georgia.—At the annual meeting held in Knoxville, Tenn., this week, 8 directors, namely, Samuel Thomas, C. S. Bryce, Alfred Sully, T. M. Logan, John G. Moore, George S. Scott, John H. Inman and F. Lehman, were elected by the holders of the first preferred stock, and 7 directors, namely, John Greenough, William L. Bull, Richard Irvine, George Coppell, Thomas P. Fowler, C. M. McGhee and James E. Grannis, were elected by the holders of the second preferred and common stock.

El Paso & Northwestern Railway & Telegraph.—The incorporators of this Texas company are: Ex-Senator William Windom, of Minnesota; ex-Senator Stephen W. Dorsey and John Riley, of New Mexico, and H. L. Detwiler, Sam Schultz, John F. Dowling, W. J. Fewell, E. A. Warner, F. H. Clarke, and T. N. Detwiler, of El Paso.

Joint Western Classification Committee.—E. D. Moore, lately Superintendent of the Western Railway Weighing Bureau, has been elected Chairman, with headquarters at Chicago.

Mexican Central.—George W. Hibbard has been appointed Assistant General Freight and Passenger Agent.

Mobile & Ohio.—W. C. Brownson has been appointed Assistant Superintendent of the St. Louis Division. R. C. Perkins has been appointed General Agent of the company, with office in New Orleans.

New Hampshire Railroad Commission.—Ex-Gov. B. F. Prescott, of Epping, N. H., has been appointed State Railroad Commissioner in place of E. J. Teamey, whose term has expired.

New Haven & Derby.—The following directors were elected this week: W. H. Starbuck, J. L. Macauley, J. A. Bowstick, Henry Hentz, E. V. Cary, and M. E. Stone, of New York; W. H. Stevenson, of Bridgeport, Conn.; N. D. Sperry and S. E. Merwin, of New Haven, and Thomas Wallace, Franklin Farrell, William E. Downs and E. N. Shelton. Lester J. Bradley has been appointed General Ticket Agent.

New York & Northern.—The office of Master of Transportation has been abolished. Herbert H. Vreeland has been appointed Trainmaster.

New York, Ontario & Western.—E. Canfield has been appointed Chief Engineer, headquarters at Middletown, N. Y. H. Tandy has been appointed Superintendent of Motive Power.

C. W. Lanpher has been appointed Superintendent of Transportation, with office at Norwich, N. Y.

Oregon Railway & Navigation Co.—C. F. Holcomb has been appointed Secretary and Assistant Treasurer, vice Theo. Wygant, resigned. A. L. Maxwell has been appointed General Passenger and Ticket Agent.

Pennsylvania.—B. B. Comegys has been elected a director to fill the vacancy caused by the resignation of D. B. Cummins.

Pennsylvania & New England Construction Co.—The officers of this company are: Gen. George S. Field, President; Robert C. H. Brock, Treasurer; David J. M. Niece, Secretary.

Portage & Southwestern.—The incorporators of this Wisconsin company are Bluford Wilson, Frank H. Jones, Samuel T. Dresser, Timothy McGrath and H. A. Stevens, of Springfield, Ill.

Richmond, Fredericksburg & Potowmac.—At the annual meeting in Richmond, Va., this week J. P. Brinton, President, and the old board of directors were re-elected.

St. Louis, Des Moines & Northern.—L. M. Martin has been appointed Superintendent and General Freight Agent.

Southern Kansas.—H. C. Brown has been appointed Acting General Baggage Agent, vice M. K. Fleming, resigned.

Toledo, Saginaw & Muskegon.—The following officers and directors were elected this week: President, David Robinson, Jr., of Toledo; Vice-President and Manager, W. V. McCracken, of New York; Secretary and Treasurer, William Baker, of Toledo; Auditor and Freight and Passenger Agent, L. K. McCracken, of Fort Wayne; Assistant Secretary, Joseph P. Pennington. Directors, David Robinson, Jr., James M. Ashley, William Baker and John Cummings, of Toledo; W. V. McCracken and George T. Evans, of New York; E. Middleton, of Greenville, Mich.; L. G. Mason, of Muskegon, Mich.; I. K. McCracken and H. M. McCracken, of Fort Wayne, Ind.

Topeka Belt.—The directors of this Kansas company are: F. R. Cordley and C. L. James, of Massachusetts; A. Wilder, G. D. Hale, O. E. Walker, J. H. Broadbush and G. F. Parmalee, of Kansas.

Union Pacific.—W. S. Condell has been appointed Freight and Passenger Agent for the New England states, with headquarters in Boston.

Valley (Virginia).—This week Samuel Spencer was re-elected President, together with the old board of directors.

Western New York & Pennsylvania.—The following officers and directors have been elected: President, G. Clinton Gardner, of Greenfield, Mass.; First Vice-President, John G. Probst, of Plainfield, N. J.; Secretary, Joseph R. Trimble, of Philadelphia; Treasurer, John Dougherty, of New York. Directors: Carl Schurz, Arnold Marcus, John D. Probst, Gustav E. Kissel, Edward L. Owen, Calvin H. Allen, Frederick Foote, T. B. Atkins, Isaac N. Seligman, G. Clinton Gardner, Boyce Gray, George W. Miller, and E. W. Clark, Jr.

OLD AND NEW ROADS.

American Midland.—A company is forming in New York with the intention of becoming incorporated under the above name. Its representatives describe the enterprise as being in an "embryonic state." Wm. Thorpe, who is President, has, in company with an engineer, been examining a route for a road through Essex, Morris and Sussex counties, New Jersey, to the Delaware River, and from there to Hazleton, Pa.

Atlantic Avenue Elevated.—President Austin Corbin, of the Long Island road, has renewed his application to the Board of Aldermen of Brooklyn for permission to construct and operate an elevated road from East New York through Atlantic avenue to South Ferry.

Atlantic & Danville.—This road, which is being extended from Norfolk, Va., to Danville, has 60 miles of road graded and track laid to Suffolk, 40 miles.

Atchison, Topeka & Santa Fe.—The 400 ft. draw span of this company's bridge across the Mississippi, at Fort Madison, Ia., was swung last week. The total length of the iron work is 1,925 ft. Trains will be running across the bridge by Dec. 1.

The company has contracted with Wells, Fargo & Co. for the handling of all the express business of the Santa Fe system, covering about 8,000 miles of road.

The company has made an agreement to build a road from Ingleside to Redonda Beach, Cal., to be finished by next spring.

Baltimore, Grafton & Charleston.—This company, which obtained its charter from the West Virginia Legislature last March, proposes to build a road from Grafton to Charleston, the state capital, a distance of 175 miles, of which 25 miles are completed as a narrow-gauge road that will be made standard. It is a Baltimore & Ohio enterprise.

Baltimore & Ohio.—The City Council of Zanesville, O., has appointed a special committee to meet the representatives of the warring railroad companies and endeavor to amicably settle the right of way disputes that have occasioned trouble for so long a time.

When the company laid its tracks along the Schuylkill River in Philadelphia, the trustees of the gas works there were indemnified against loss. The tracks completely demolished the works. The Director of Public Works will proceed to collect \$200,000 damages from the company, and if it refuses to come to terms amicably, the Court of Quarter Sessions will be asked to appoint a jury to assess the damages.

Blackville & Barnwell.—Michael B. Brown has bought this South Carolina road for \$70,000.

Blue Spring, Orange City & Atlantic.—This road, extending from Berlin to New Smyrna, Fla., 28 miles, was sold last week at Jacksonville, Fla., under a decree of foreclosure. It was bought by E. R. Chapman, of New York, for \$140,700.

Boston & Maine.—Arrangements have been entered into by which this company is to operate the Northern, of New Hampshire, for a term of one year on the same terms as if the Haze bill had become a law.

Boston & Providence.—At the annual meeting in Boston this week, the vote on the proposition to lease the road to the Old Colony resulted in 24,176 for and 1,114 against.

Cairo & Tennessee River.—The line is now under contract from Cairo to Mayfield, Ky., about 40 miles, and the next division of 50 miles is to be put under contract early in the spring. B. A. Neal, of Mayfield, is President.

Carolina, Knoxville & Western.—The directors met on Nov. 17 to let the contract for the entire line from Knoxville, Tenn., to Port Royal, S. C.

California Southern.—The line has been completed to San Juan, Cal., and the first passenger train was run to the latter place from San Bernardino last week.

Central Indiana.—Articles of incorporation have been filed in Indiana. The company intends building a line from Fort Wayne to Terre Haute, 200 miles, through the counties of Wabash, Grant, Miami, Howard, Carroll, Tippecanoe, Montgomery, Fountain, Park and Clay. Capital stock, \$100,000.

Canadian Pacific.—Sir George Stephen, President of this company, sailed for England last week for the purpose of closing the contract for three new steamers to ply between Vancouver, B. C., and Japan.

Central Iowa.—The main line was sold at Marshalltown, Ia., last week, and was bid in by James Thompson, of New York, acting in behalf of the Stickney re-organization committee, for \$2,400,000. The reorganization will now proceed without delay.

Central, of New Jersey.—The reorganization of this company is practically accomplished, and the new 5 per cent. bonds will be listed on the New York Stock Exchange within a few days. Holders of bonds and guaranteed obligations to the amount of \$31,663,000 have accepted the reorganization scheme. The new fixed charges will be about \$450,000 less per annum than at present. The net earnings of the company for nine months amount to \$4,113,446, or sufficient to pay all fixed charges of the reorganized company for that time and leave a balance of \$867,000, equivalent to 4½ per cent. on the stock. The road will be taken out of the hands of Receivers Jan. 1.

Central Vermont.—The bridge at White River Junction, Vt., which replaces the one carried away in the accident of last February, has just been finished. Its length is 650 ft., and it is composed of four spans of 150 ft. each and one of 50 ft. The weight which it is constructed to carry is 3,000 lbs. a foot, or 225 tons to the span.

Chatham & Harwich.—This Massachusetts road has been completed and will be open for business as soon as the Commissioners have inspected it.

Chicago & Eastern Illinois.—The final steps are being taken to consolidate the company with the Chicago & Indiana Coal road, and in a few days the two roads will be united. A new set of officers and two additional directors will be elected. Both lines connect the Brazil, Ind., coal fields with the Chicago market, and were once lively competitors for the business.

Chicago, Milwaukee & St. Paul.—It is reported that the company is purchasing land for a line from Milton Junction, on the Prairie du Chien Division, to Libertyville, Ill., a point on the Chicago & Milwaukee Division. By building this extension the road would be shortened about 50 miles between Chicago and St. Paul.

Chicago & Northwestern.—The extension of this company's line from Ishpeming to Michigamme, Mich., is blocked by the Duluth, South Shore & Atlantic's refusal to allow the company to build across its tracks. The only other way of building the extension is by tearing down a number of buildings belonging to the Michigamme Iron Co., and this action is also strongly objected to. All work on the extension has been stopped.

Chicago, Santa Fe & California.—On this road now building from Chicago to Kansas City, 180 miles of track had been laid up to Oct. 31 in Illinois, Iowa and Missouri. This, in addition to the 94 miles from Chicago to Anconia acquired by purchase, makes 274 miles completed, leaving 168 yet to be built. Tracklaying is actively in progress at ten different points, and will probably be finished early in December.

Chicago & West Side.—Articles of incorporation have been filed in Illinois. The company intends building a road from the western limits of Chicago to the town of Proviso, with a branch to Riverside. Capital stock, \$1,000,000. Office at Chicago.

Cincinnati, Hamilton & Dayton.—The Circuit Court at Cincinnati last week overruled the decision of Judge Vanderveer, which placed this road in the hands of a receiver.

Cleveland, Akron & Columbus.—The Dresden branch of this road has been completed from its starting point, Killbuck, in Holmes County, O., to Warsaw, in Coshocton.

Columbus, Hocking Valley & Toledo.—It is stated that the company has begun suit to recover \$8,000,000 against Winslow, Lanier & Co., its fiscal agents in New York. The suit is similar to the one against Stevenson Burke, formerly President, of the company, for the same amount, which is now pending in the Ohio courts. The litigation springs from the change in management made last January, when John W. Shaw was elected to succeed Judge Burke as President.

Columbus Southern.—The contracts for this line from Columbus to Albany, Ga., 87 miles, will be let within 30 days. There will be one iron bridge of three 150 ft. spans. W. S. Greene, of Columbus, is Chief Engineer.

Decatur, Chesapeake & New Orleans.—Bedford County, Tenn., will, on Dec. 3, vote on the proposition to subscribe \$150,000 to the stock of this company.

Des Moines, Osceola & Southern.—This road has been bought by M. V. B. Edgerly, in the interest of the Eastern bondholders, for \$305,000. The road extends from Des Moines, Ia., to Cainsville, Mo., 111 miles.

Duluth, Red Wing & Southwestern.—Negotiations are in progress for the consolidation of the company with the Sioux & Southwestern. It was decided at a meeting held in St. Paul, Minn., last week to commence on the new line immediately.

Durango, Cortez & Salt Lake.—This company has been incorporated in Colorado to build the Cortez & Dolores Valley road from Cortez to Rico, Col.

Durham & Northern.—Work was begun on the road at Durham, N. C., last week. The line is to be built to connection with the Seaboard & Roanoke.

El Paso & Northwestern Railway & Telegraph.—The company has been chartered in Texas and proposes building a road from El Paso northward to the White Oaks coal fields in New Mexico, thence to Las Vegas, thence through the Pan Handle of Texas to a connection with the Chicago, Rock Island & Pacific or some other road now building through that country. The company will buy the franchise of the El Paso, St. Louis & Chicago, which company was chartered two years ago, and now has 5 miles graded on the proposed route. The capital stock of the company is \$300,000.

Fitchburg.—A contract has been closed with the Westinghouse Electric Co. to light the Hoosac Tunnel by incandescent electric lights. The work of constructing the plant is now in progress. There will be 1,250 25 candle-power lights used.

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Georgia.—The bills introduced in the Legislature to incorporate the following railroad companies have become laws: The Waycross Air Line, the Blue Ridge, the Long Shoals & Rockland, the Augusta, Thomasville & Gulf, the Lexington Terminal, the Gainesville & Columbus, the Lookout Mountain, Lulu Lake & Gadsden, the Jackson & Indian Springs, the Fort Valley & Dublin, the Albany, Cuthbert & Western, the Eastman & Americus Air Line, the Holcomb & Hawkinsville, the Catosa Springs, with power to build a railroad; the Newton, Morgan & Lumpkin, the Albany & Baunbridge, the Atlantic & Blue Ridge, the Great North & South, the Carrollton, Marietta & Western, the Alabama Midland, the Buena Vista & Ellaville, and the Thomasville & Ty Ty.

Housatonic Valley.—This road, which was chartered early in the year and passed into the hands of New York & New England representatives last week, will be built at an early day. The road will be about 13½ miles long and will connect with the Housatonic at Botsford, Conn.

Hudson Bay.—The company is suing Mann & Holt, the contractors, for \$200,000 damages for failure to build the road equal to the government standard, by reason of which the latter refused to give the company its subsidy of \$12,000 per mile.

Idaho Central.—The route has been surveyed for a distance of 40 miles above Boise City, Idaho.

Indiana, Bloomington & Western.—The third step in the reorganization of this system and the consolidation of the various lines was taken on Nov. 15 by filing articles of consolidation of the Springfield & Western and Indiana & Western, the line running from Springfield, Ohio, to Pekin, Ill. The joint capital stock is \$13,325,000. The directors are: Austin Corbin, of Philadelphia; C. W. Fairbanks and C. Henderson, of Indianapolis; John A. Glover, of Urbana, Ill.; J. B. Mason, E. L. Stewart and William Beckwith, of Danville, Ill. The complete reorganization of the system will be made in January, and it will then be known as the Columbus, Indianapolis & Western.

Intercolonial.—The contract for the Pictou & Mingan branch, 28 miles, has been awarded to Clark, Gray & Trites of Salsbury, N. B., and J. L. & C. P. Harris, of Moncton.

Kansas City, Wyandotte & Northwestern.—Track is laid to Circleville, 90 miles from Kansas City, Mo.

Lake Erie & Western.—The extension to Peoria, Ill., is nearly completed, only a gap of 15 miles remaining to be filled. It will probably be ready for operation by the first of the year.

Lawrence, Atchison & Southern.—The survey of this road between Atchison and Lawrence, Kan., is completed. It will be continued southward to the Indian Territory via Ponoma. The money to build the road is being furnished by New York capitalists. Work will be commenced immediately.

Lehigh & Susquehanna.—The new branch from Wilkesbarre to Scranton, Pa., is being pushed to completion rapidly. The bridges are almost completed, the abutments for those at Scranton being nearly all up. Traffic on the new branch will be commenced early in the year.

Louisville, Cincinnati & Virginia.—The company is surveying a route from Winchester, Ky., to Big Stone Gap and has located its line to Baileyville.

Louisville & Nashville.—Work will begin at once on the new shops at Decatur, Ala. There are to be 14 buildings of brick, of from 150 to 280 feet in length. These works will bring at least 1,000 skilled mechanics to Decatur.

Louisville, New Albany & Chicago.—The company has concluded not to extend its branch from Bainbridge to Brazil, Ind., as was intended some weeks ago.

Metropolitan Transit.—Corporation Counsel O'Brien has taken an appeal from Justice Donohue's order appointing commissioners to condemn right of way along Broadway for this company to build an elevated road, and Judge Donohue has granted an order staying all proceedings on the part of the company until the city's appeal is determined. The commissioners will be formally chosen on Nov. 23, but they will not be able to act until the matter is decided.

Mexican Central.—The Guadalajara branch, 150 miles in length, is promised to be opened on March 31, 1888, with a grand celebration to commemorate the occasion. The company has ordered 10 new locomotives and several hundred new freight cars.

Missouri Pacific.—The extension from La Grange to Houston, Tex., is rapidly nearing completion, and by the first of the year through trains to Houston and Galveston will be running from Fort Worth over this new line.

The grading on the company's new line from Talmage, Neb., to Creek, Mo., 80 miles, is finished. This will be the company's short route to St. Louis for Nebraska business.

New Roads.—A number of Philadelphia capitalists, says the Philadelphia Record, have secured an old charter for a line of railroad from Tomhickon, in Luzerne County, Pa., to Port Jervis, N. Y. The line will be 100 miles in length, and 10 miles of it have been graded. At Tomhickon connection will be made with the Lehigh Valley and the Pennsylvania lines, and at Port Jervis with the New York, Lake Erie & Western. B. F. Houseman, of Philadelphia, has been made President, and Joseph H. Louchheim, Eugene Loeb and Horace M. Royal, also of Philadelphia, have been elected directors.

A company is being formed to build a road from Hermosillo, on the Sonora Railway, to a point on the Mexican Central near Chihuahua, and to terminate at Eagle Pass.

New York Central & Hudson River.—The contract for building the pier at West Thirty-second street, New York, has been approved by the Controller, and work will begin at once. The pier will cost \$66,000.

New York, Lake Erie & Western.—This company has completed its line from Hawley to Pitston, Pa. A survey is now being made for a line from Dunmore to Carbondale, Pa.

Norfolk & Western.—Work on the Clinch Valley extension, which is to connect this road with the Louisville & Nashville, is going on steadily and will be completed in the fall of 1888.

Northern Pacific.—It is stated that the company will run express trains from St. Paul to Portland, Ore., reducing time 18 hours, to compete with the Union Pacific.

Ohio, Kentucky & Virginia.—This is an extension of the Chattanooga railroad from Ashland to Richardson, Ky. Twelve miles are now under construction.

Ohio & Northwestern.—The completion of the change of gauge on this road was accomplished last week, and through trains are now running from Cincinnati to Portsmouth, O.

Orange Belt.—It is stated that Philip D. Armour, of Chicago, has purchased an interest in this Florida road, and thus relieved the somewhat strengthened financial condition which the enterprise has occupied since it was started last year. The work of construction is now being rapidly pushed. The road has 60 miles in operation and as projected will extend 150 miles.

Oxford & New Glasgow.—This Nova Scotia company invites bids for grading, bridging and fencing 42 miles of road. Plans and specifications are at the company's office in Wallace, N. S., and at the office of the Chief Engineer of Government Railroads, Ottawa, Canada.

Pennsylvania.—Property owners along Railroad avenue, in Jersey City, are opposed to the elevation of the company's tracks, and are petitioning the mayor not to affix his signature to the resolution passed by the Board of Public Works giving such power to the company.

Philadelphia & Reading.—The company has given orders for the construction of 75 new passenger cars at Wilmington, Del.

Pine Bluff, Monroe & New Orleans.—Grading was begun last week at Pine Bluff in the direction of Little Rock, Ark., and will be rapidly pushed to completion.

Portage & Southwestern.—Articles of incorporation have been filed in Wisconsin by this company, which proposes building a road from Portage to a connection with the Chicago, Burlington & Northern in the northwestern part of Illinois, opposite East Dubuque. A branch is also to be constructed to Madison, Wis., from the main line, making a total mileage of 135 miles. The capital stock is \$3,750,000.

Pert Jervis, Monticello & New York.—This company has decided to issue first mortgage bonds on the road to the amount of \$500,000 for the purpose of completing the extension from Huguenot to Summitville, N. Y., equipping the road, etc.

Raleigh & Gaston.—Surveys have been made for an extension of the road from Henderson to Durham, N. C., 45 miles, and a line is now being located from Franklinton to Durham.

Red River Valley.—The court at Winnipeg has delivered judgment, granting the injunction of the government against this company. It holds that the Red River Valley act, under which the province built the road, as void, overthrows the public works act, establishes the jurisdiction of the Manitoba court to deal with such a case, and affirms that the title of the Dominion government to the lands set out is perfectly good.

Rome, Watertown & Ogdensburg.—It is reported that the company will soon conclude arrangements with the New York, Lake Erie & Western for the privilege of running trains over the latter road from Lockport, N. Y., through to Buffalo, via Tonawanda. A branch would have to be built from Olcott to Lockport, 9 miles.

St. Louis, Arkansas & Texas.—Tracklaying progresses rapidly, and is now finished past Wylie, Tex., will be completed to Plano on Nov. 19, will reach Grapevine between Dec. 10 and 15, and Fort Worth by Jan. 5.

St. Louis, Iron Mountain & Southern.—The Memphis branch has been extended from Bald Knob, Ark., east to Wynne, 45 miles.

San Antonio & Aransas Pass.—Tracklaying on the Waco branch was finished to Flatonia, Tex., last week.

Shingle Springs & Placerville.—The grading of this road between Shingle Springs and Placerville, Cal., is nearly completed, nine of the 12 miles being finished. During the next three weeks a tunnel will be blasted.

Tennessee Midland.—Since the Court refused to submit to a vote of the people the second time the subsidy proposition for this enterprise, those who want the road built have been consulting together, and merchants have organized a committee to procure subscriptions. At a meeting in Nashville this week it is reported that \$100,000 in subscriptions was raised. It is the intention if possible to raise \$250,000 as an inducement for the road to go to Nashville.

Texas & Pacific.—Among the improvements that it is said will result from the recent sale of this property will be a separate track for the road from Sierra Blanca to El Paso, Tex., 92 miles, the Southern Pacific's tracks having been used heretofore. Also a depot at El Paso and a bridge across the Rio Grande.

Topeka Belt.—Incorporated in Kansas, with the object of building 50 miles of road from Topeka, as the central point, to various points in the county. Capital stock, \$1,000,000. Headquarters, Topeka.

Union Pacific.—The company has filed suit against the Kansas City, Wyandotte & Northwestern to enjoin the latter from building tracks along its proposed entrance to Leavenworth, Kan. The land is a narrow strip between the Missouri River and the bluffs and is the only accessible entrance to the city for the Northwestern. The latter took the land by condemnation processes. The Union Pacific claims it under the old Missouri River road's franchise, dating back 20 years.

The road will be extended from Topeka to Wichita, Kan., without delay. The Hutchinson (Kan.) line has been abandoned on account of its impracticability.

The Cheyenne & Northern branch to Fort Fetterman, Wyo., is opened for business.

TRAFFIC AND EARNINGS.

The Inter-state Commission.

The Board of Trade of Lincoln, Neb., enters a complaint against the Missouri Pacific concerning freight rates from St. Louis, Mo., to Lincoln, which are alleged to be unreasonably high. The same organization complains of the Chicago, Burlington & Quincy's rates from Chicago on the same grounds.

Plummer, Perry & Co., of Lincoln, Neb., complain of the Union Pacific's method of bringing sugar from San Francisco, which, it is claimed, is hauled to Omaha and then back to Lincoln.

The New Orleans Cotton Exchange complains of local rates on cotton over the Cincinnati, New Orleans & Texas Pacific, which are much higher than the same road charges for cotton shipped through to the North.

Limiting Passenger Fares.

The Board of Railroad Commissioners of Minnesota has directed the St. Paul, Minneapolis & Manitoba and the Northern Pacific companies to reduce their passenger rates to not more than 3 cents per mile.

Close of Canal Navigation.

Superintendent of Public Works Shanahan has ordered New York State canals closed Dec. 1.

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

Month of October:

Atch. T. & S. Fe.	1,661,231	1,672,072	D.	10,851	0.6
Atch. T. & Pac.	226,887	169,515	I.	57,372	28.7
Bur. C. R. & No.	319,688	316,204	I.	3,464	1.0
Central of Iowa.	128,978	133,365	D.	4,387	3.2
Ches. & Ohio.	413,272	372,031	I.	41,241	11.0
Eliz. Lex. & B.S.	101,530	90,674	I.	10,856	19.6
Ches. & S.W.	219,833	181,437	I.	38,386	21.1
Chi. St. L. & P.	545,366	465,637	I.	79,719	17.1
Chi. St. P. & R. C.	39,486	21,202	I.	18,284	86.2
Cin. N. O. & T. P.	328,542	289,919	I.	38,623	13.3
Ala. St. South.	153,792	124,072	I.	29,720	20.7
N. Or. & N. E.	81,016	74,594	I.	9,542	12.8
Vicks. & Mer.	66,390	54,047	I.	12,343	22.8
V., Shre. & P.	77,578	68,193	I.	9,385	13.7
Tont. C. N. O. & T. P.	710,348	610,735	I.	99,613	16.2
Cin. R. & Ft. W.	36,900	36,683	I.	207	0.5
Cin. W. & Balt.	217,334	191,579	I.	25,755	13.4
Cl. C. C. & I.	413,558	394,820	I.	18,738	4.7
Cleve. & Marietta	31,176	2,079	I.	8,497	36.9
Col. & Cum. Mid.	30,416	29,518	I.	898	3.0
Des. & R. Gr. W.	130,000	104,490	I.	25,600	24.5
Det. B. C. & Alp.	37,740	28,002	I.	9,098	34.6
Lub. & S. Cut.	91,422	..	..	..	..
Cd. F. & Min.	10,959	..	..	..	..
Fla. Ry. & Nav. Co.	90,052	79,597	I.	10,455	13.1
E Tenn. Va. & Ga.	5,635	456,617	I.	99,718	21.8
Geo. Pac.	116,907	89,108	I.	27,859	31.2
Gr. R. P. & Ind.	230,092	90,136	I.	18,763	9.6
Grand Trunk.	1,557,202	1,530,575	I.	26,627	1.7
Hous. & Tex. Cen.	405,588	378,265	I.	27,323	7.2
Ill. Central.	1,192,932	1,138,385	I.	54,547	4.7
Ind. Dec. & Sp.	38,518	40,153	D.	1,635	4.0
Iowa, F. & S. C.	70,517	..	..	..	..
Kan. C. Ft. S. & G.	241,944	231,675	I.	10,369	4.4
Kan. C. Sp. & Mem.	174,900	154,187	I.	20,713	13.4
Kan. C. Cl. & Sp.	22,337	21,176	I.	1,161	5.4
Kentucky Cent.	101,706	92,260	I.	9,446	12.4
Keok. & West.	31,555	29,878	I.	1,679	5.6
King. & Pemb.	20,079	13,798	I.	0,281	45.5
Lengh & Hud.	15,674	20,366	D.	4,692	23.0
Little R. & M.	106,518	86,912	I.	10,806	22.5
Louis. Ev. & St. L.	94,497	84,668	I.	9,829	11.6
Louis. N. O. & Chi.	208,269	187,636	I.	20,633	10.9
Marq. H. & Ont.	116,524	110,066	I.	6,428	16.4
Minn. & N. W.	200,134	59,973	I.	140,161	233.5
Memp. & Chas.	177,983	160,908	I.	17,075	10.6
N. Y. C. & H. R.	3,531,900	3,190,361	I.	344,539	10.7
Ohio & Miss.	403,753	367,747	I.	36,066	9.7
Ohio River.	43,432	20,858	I.	22,574	108.0
Rich. & Dan. Sys.	446,500	388,600	I.	107,900	12.8
St. L. A. & T. H.	326,199	284,225	I.	41,974	14.7
St. P. M. & Man.	1,061,933	950,057	I.	111,876	11.7
Shen. Val.	95,000	81,954	I.	13,046	15.9
Stat. Ist. Rep. T.	63,361	56,691	I.	6,670	11.7
Tol. Peor. & West.	102,720	82,473	I.	20,247	24.5
Total.....	\$18,241,721	\$16,491,851	I.	\$1,729,870	...
Net.....	..	..	D.	821,585	...
Net.....	..	..	I.	1,751,455	10.4

Month of October:

Cleve. & Canton.	\$40,100	\$33,816	I.	\$6,284	18.5
Net.	15,733	8,346	I.	7,387	8.0
Cot. H. Vy. & Tol.	129,203	..	..	..	..
Net.	25,228	..	..	..	..
Nash. C. & St. L.	265,024	213,199	I.	51,825	24.3
Net.....	114,917	85,786	I.	29,131	33.9

Month of September:

Ches. & Ohio.	\$410,328	\$388,992	I.	\$21,336	5.4	
Net.	162,273	140,016	I.	22,257	15.8	
Eliz. Lex. & B.S.	109,97	95,802	I.	13,005	14.5	
Net.	50,306	37,759	I.	12,547	33.1	
C. I. St. L. & C.	255,208	245,523	I.	9,745	3.9	
Net.	101,937	99,822	I.	2,115	2.1	
Denver. R. G. D.	735,551	646,034	I.	167,517	16.6	
Net.	336,778	274,171	I.	62,607	22.8	
Det. B. C. & Al.	43,560	19,369	I.	24,140	124.4	
Net.	17,528	10,611	I.	16,917	159.5	
Keok. & West.	36,353	28,270	I.	2,083	7.3	
Net.	10,444	Def. 2,082	I.	12,527	1.2	
Kentucky Cent.	107,318	94,805	I.	12,513	13.1	
Net.	56,759	39,355	I.	17,404	45.9	
Louis. & Nash.	1,437,908	1,253,980	I.	183,928	14.6	
Net.	59,657	528,540	I.	67,117	12.6	
Lou. N. O. & T.	181,533	131,988	I.	49,545	37.5	
Net.	58,681	34,00	I.	24,681	72.5	
Mem. & Charles.	156,466	120,680	I.	35,819	29.6	
Net.	61,385	52,935	I.	8,450	15.7	
Minn. & St. L.	129,720	134,625	D.	24,905	4.5	
Net.	48,125	63,766	D.	15,641	38.1	
Minn. & N. W.	186,270	59,465	I.	126,805	213.2	
Net.	55,360	27,169	I.	28,191	103.6	
New Brunswick.	81,407	75,186	I.	6,221	8.2	
Net.	30,011	28,778	I.	1,233	4.2	
N. Y. P. & Nor.	43,574	36,623	I.	6,951	18.9	
Net.	11,007	7,033	I.	3,974	58.8	
Ohio & Miss.	408,054	393,261	I.	14,793	3.7	
Net.	167,013	147,784	I.	19,229	13.0	
Petersburg.	28,179	25,657	I.	2,522	9.7	
Net.	Def. 20,599	11,905	D.	32,504	1.0	
Phila. & Erie.	339,523	357,034	D.	17,511	4.9	
Net.	106,976	122,893	D.	15,917	12.9	
Penn. (W. of Pitts.):	N. W. Sys.	1,742,095	1,452,805	I.	289,290	19.9
Net.	69,069	603,530	I.	91,539	15.1	
S. W. Sys.	1,274,380	1,145,353	I.	129,027	11.2	
Net.	363,558	346,920	I.	16,638	4.7	
Total W. of Pitts.	3,016,475	2,598,158	I.	418,317	14.9	
Net.	1,058,627	950,450	I.	108,177	11.2	
Pitts. & West.	200,340	151,862	I.	48,478	31.9	
Net.	55,478	38,996	I.	16,492	42.2	
Rich. & Peterb.	18,866	18,633	I.	233	1.2	
Net.	Def. 1,753	10,524	D.	12,277	116.9	
Rome, Wat. & Og.	335,604	293,540	I.	42,064	14.2	
Net.	175,583	153,229	I.	22,354	14.5	
Scoti. Valley.	77,768	70,447	I.	7,321	10.3	
Net.	25,451	..	..	..	..
Seab rd & Roan.	65,638	46,067	I.	19,571	42.4	
Net.	28,265	13,981	I.	14,284	101.9	
Shenandoah. Val.	9,1304	85,221	I.	8,083	9.4	
Net.	12,798	26,507	D.	3,709	13.9	
South. Pac. Co.: Gal. H. & S. A.	295,097	218,811	I.	76,286	34.8	
Net.	83,217	29,010	I.	54,307	185.9	
Louisiana. & West.	72,936	57,267	I.	15,669	27.3	
Net.	49,162	31,208	I.	8,954	28.6	
Mor. L. & T.	375,759	339,967	I.	35,792	10.5	
Net.	109,745	59,673	I.	50,072	83.8	
N. Y. T. & M.	17,402	15,440	I.	1,962	12.7	
Net.	5,384	5,945	D.	561	9.5	
Texas & N. O.	109,993	80,285	I.	20,708	24.0	
Net.	54,66	40,750	I.	13,416	32.8	
Total At. Sys.	871,187	723,771	I.	147,419	20.3	
Net.	292,674	166,855	I.	126,082	75.6	
Total Pac. Sys.	2,627,354	2,322,215	I.	305,139	13.1	
Net.	1,182,002	1,196,853</td				